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THE ARCHITECTURAL FORUM

VOLUME XXXI NUMBER 4

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ALBERT J. MacDONALD, Editor

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Photograph by John Wallace Gillies

THE ARCHITECTURAL FORUM

FOR QUARTER CENTURY THE BRICKBUILDER

VOLUME XXXI | OCTOBER 1919 | NUMBER 4

Government Housing Work at Bridgeport, Conn.

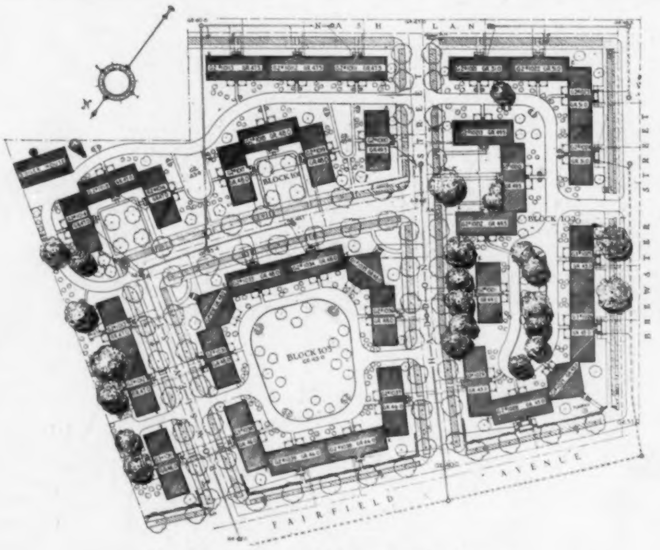
By W. STANLEY PARKER, A.I.A.

WHEN the Government started its housing at Bridgeport, the Bridgeport Housing Company, composed of a group of leading manufacturers interested in the proper housing of their mechanics, had already constructed a group of two-family houses, compactly planned for varying sized apartments and relatively low rents, on Connecticut avenue, and a higher-rent apartment house on the other side of the city, and also a group of some twenty single and two-family houses just outside the city limits in the town of Fairfield.* This last group of which R. Clipston Sturgis was architect, was the beginning of a larger development interrupted by the war. Here were developed two types later used, substantially unchanged, in the Government work. One of these, called H-3, is shown in plan on page 115, and two types of exterior treatment of it in the illustrations on page 116.

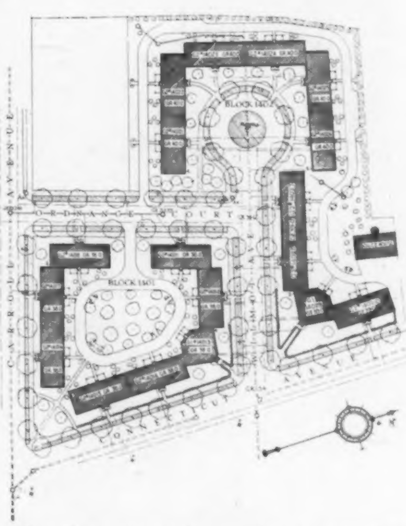
After considering many sites, the Government selected for immediate development, two on the easterly and two on the westerly side of the city. In each case, one was on comparatively expensive land and developed more intensively with three-story apartment buildings while the other was adapted to a development with single and two-family houses. The apartments gave about thirty-one families per gross acre; while the houses gave about ten. Later a fourth site was added to the south of the central part of the city, close to the factories, and adapted to a lower rent development.

The apartments were developed from a standard four-room unit which had already been developed by the Bridgeport Housing Company and Mr. Sturgis. The plan is shown on page 112. The front and rear stairs in each unit are enclosed in brick walls with Kalomein doors at all openings, the rear stairs themselves being concrete, thus eliminating outside fire escapes. These units, three stories high, accommodating six families each, were combined in various groupings, as indicated by the two-plot plans of the "Black Rock" and "Connecticut avenue" groups. The "Black Rock" group, known as Site 1, has a frontage on Fairfield avenue, a main thoroughfare. It lies near the western limit of the city, and accommodates 216 families. The "Connecticut avenue" group, Site 14, is also on a main thoroughfare, but in the eastern section of the city. It accommodates 108 fam-

*Published in The Architectural Forum, February, 1918.

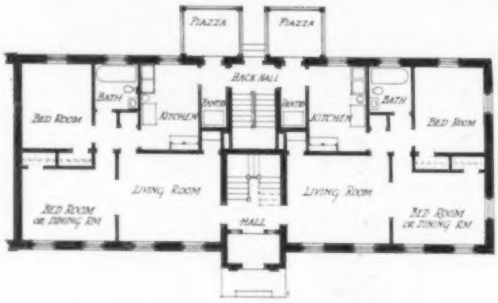


Plot Plan, Site 1, Black Rock Development

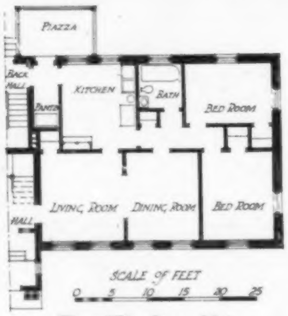


Plot Plan, Site 14, Connecticut Avenue Group

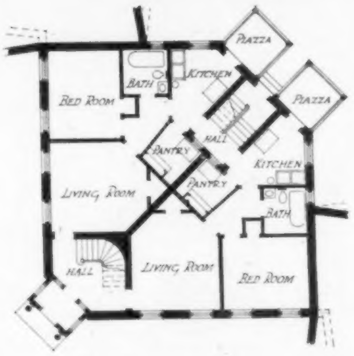
Bridgeport, Conn., Housing Developments



Plan of Typical Four-Room Unit



Plan of Five-Room Unit



Three-Room Corner Unit

Views of Apartment House Groups in Black Rock Development, Bridgeport, Conn.
R. Clipston Sturgis, Architect

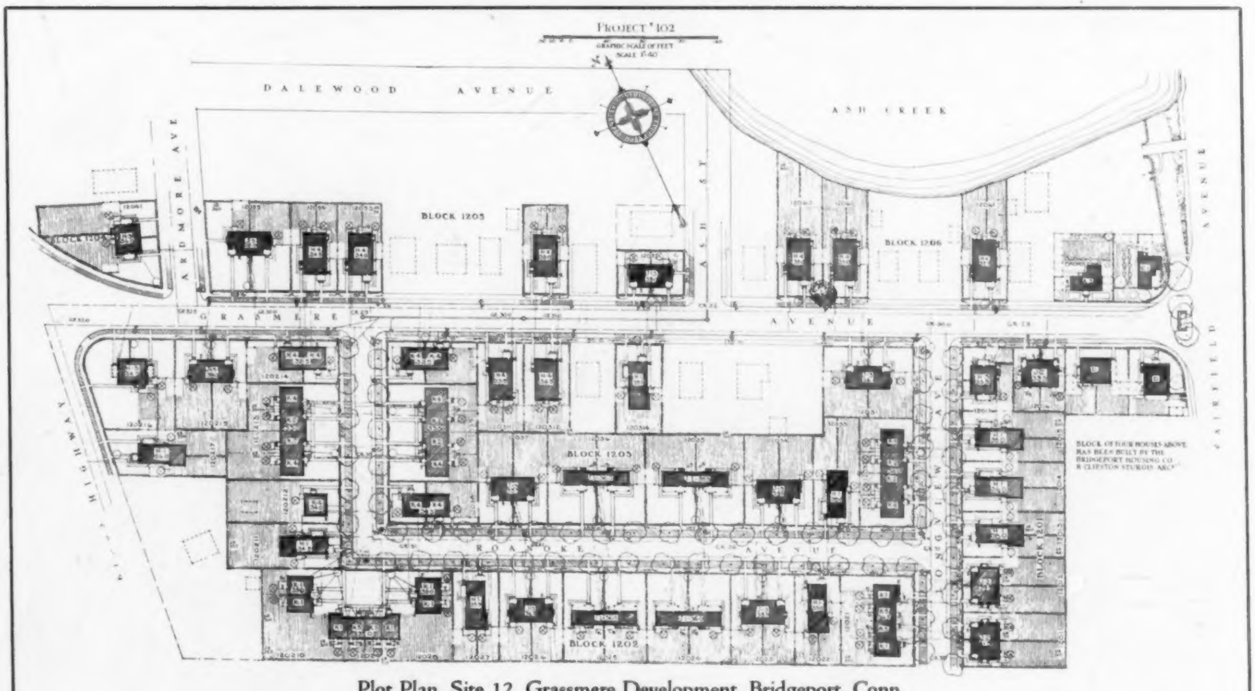
View Looking West Along Howsley Street, Black Rock Development

ilies. Here the units are all four-room units, except the two three-room corner units, but at "Black Rock" a number of five-room units are used along the important frontage on Fairfield avenue. The grouping of these units provides several large enclosed playground spaces for the younger children. Each unit is reached by a service road at the rear and each group is heated from a central plant with pump-circulated hot water.

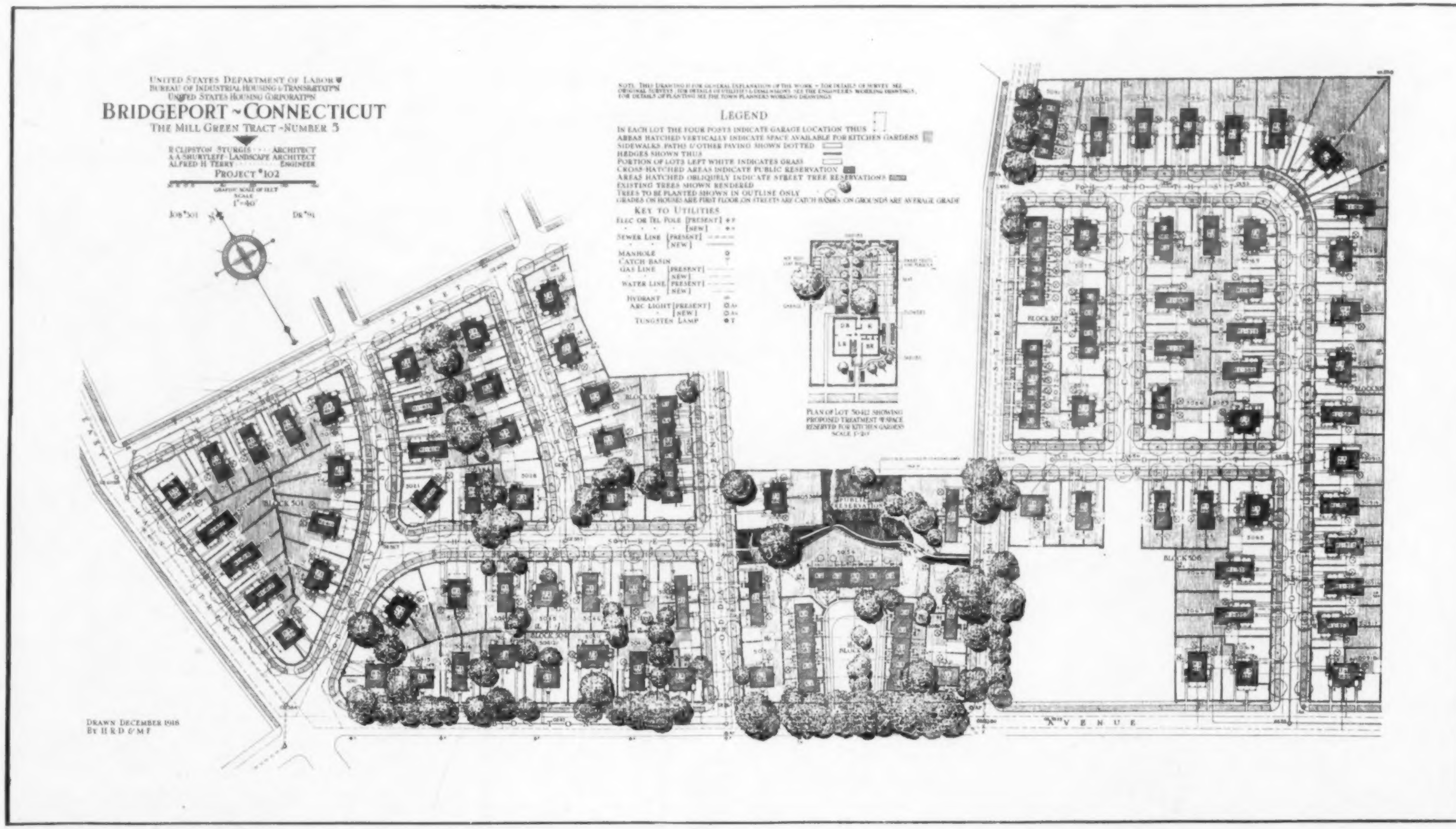
Rear Yards of Apartment House Group

At Site 5, the plan of which is shown on page 114, the development consists of several different types of single, semi-detached and two-family houses, with some row houses.

Types H-1, H-2 and H-3 (see pages 115 and 116) are the two-family houses,—a family on each



Plot Plan, Site 12, Grassmere Development, Bridgeport, Conn.
R. Clipston Sturgis, Architect; Skinner & Walker, Associate Architects



PLOT PLAN, SITE 5, MILL GREEN DEVELOPMENT, BRIDGEPORT, CONN.

R. CLIPSTON STURGIS, ARCHITECT; ARTHUR A. SHURTLEFF, TOWN PLANNER

This development is on comparatively inexpensive land permitting a grouping of single, semi-detached, two-family and some row houses, averaging ten families to the gross acre. The land is comparatively level, but of such awkward shapes that a coordinated street layout was difficult. Several large existing trees were carefully preserved in determining the location of houses, and the resulting effect is interesting and attractive.

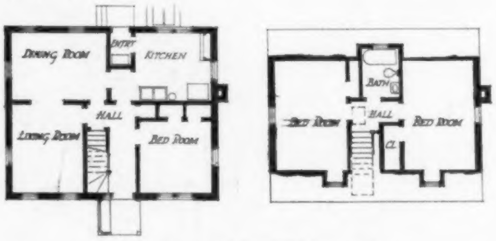
View Looking South Along Colony Street in Mill Green Development

Floor Plans of Two-Family House, H-3

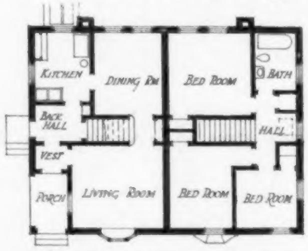
floor. The plan H-1 was developed for narrow lots, 50 feet wide, the typical Bridgeport city lot. Plan H-2 was more compactly planned for a wider, shallower lot, and H-3, with its two entrances at opposite ends of the house, was particularly adapted to corner lots.

Types J-1 and J-2, the plan of the latter, of which many were built, being shown on this page, are semi-detached houses, with a party wall.

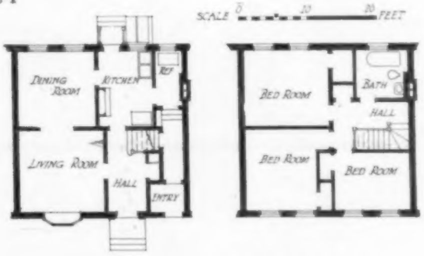
The K type house was planned to permit construction in rows but without rear alleys, the service entrance being at the front. Types K-6 to K-11, inclusive, designed for use on Site 4, have but a single entrance in the front, which is used for service purposes as well. Types K-1 to K-5 are designed for use where such combined use of the front entrance would not be acceptable. In these types there is a separate service entrance in the front wall of the house. A lattice door gives entrance to a service vestibule in which the garbage container is located, and from which access is



Floor Plans of Single House, L-1



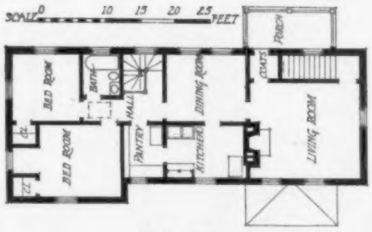
Plan of Duplex House, J-2



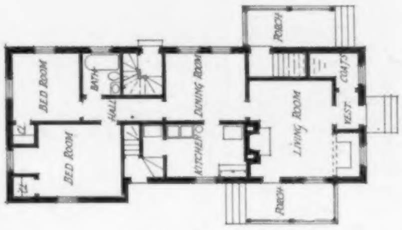
Floor Plans of Row Unit, K-4

Row Houses (K-1—K-5 Types) around Court on Boston Avenue, Mill Green Development

Duplex House, J-2 in Foreground; Two-Family House, H-3 at Right

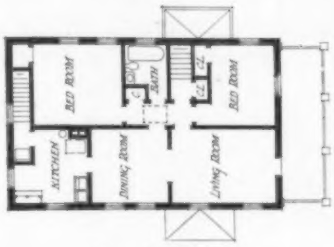


Second Floor Plan



First Floor Plan

Two-Family House, H-1



Second Floor Plan

First Floor Plan

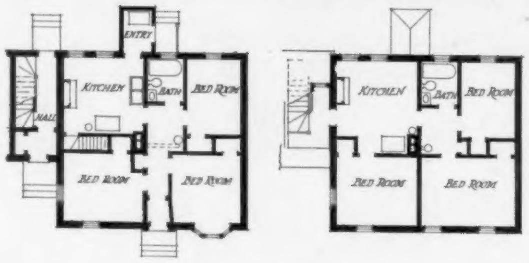
Two-Family House, H-2

Two-Family Houses, H-1 at Left, H-3 at Right

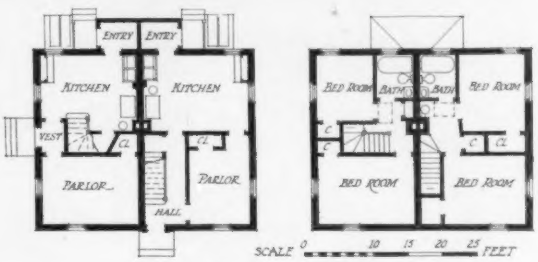
View Looking North on Roanoke Street to Court, Grassmere Development, Site 12

R. Clipston Sturgis, Architect; Skinner & Walker, Associate Architects

View Looking North Across Green from Burnham Street, Crane Development



Floor Plans of Flats, K-11



Floor Plans of Unit in Groups

Plot Plan of Crane Development, Bridgeport, Conn.

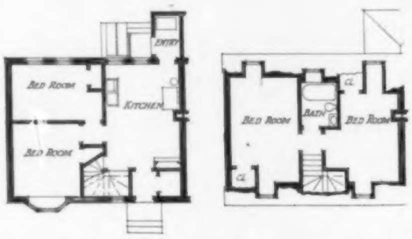
R. Clipston Sturgis, Architect; Andrew H. Hepburn, Associate Architects

View of Court on Sims Street Showing Flats (K-11) in Center, Crane Development

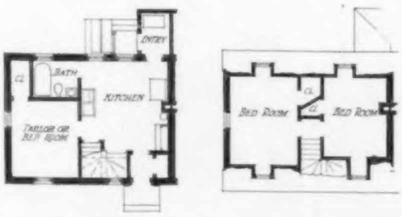
had both to the cellar and to the kitchen. (Plan of K-4 on page 115, also bottom illustration.)

The layout of Site 12 was less unified since it covered a tract already laid out with streets on which some lots were already developed. Messrs. Skinner & Walker were associate architects with Mr. Sturgis in the final development of this site, determining the exterior treatment and the two additional types, H-4 and J-3, used only here.

The layout of the Crane Tract, Site 4, was based on an endeavor to secure picturesqueness of effect, in spite of the original intention to develop this tract as economically as possible for lower rents. The houses included some three-room apartments, and in all cases were of the kitchen-living-room type. Also furnaces were omitted, a coal range in the kitchen furnishing all the heat. In spite of these elements of plan, they are being rented at higher rents, and furnaces have now been installed. The original intention, therefore, of building inexpensively for lower-rent tenants has been departed from, but a picturesque effect of considerable charm secured.



Plans of Single Family Unit Used in Rows



Plans of Four-Room Unit Used in Rows

View Looking East along Flanders Street from Intersection with Sims Street, Crane Development
R. Clipson Sturgis, Architect; Andrew H. Hepburn, Associate Architect

The Design of a House at Chestnut Hill, Philadelphia

THE RESIDENCE OF FRANCIS S. McILHENNY, ESQ.

MELLOR, MEIGS & HOWE, ARCHITECTS

By ARTHUR I. MEIGS

IN the consideration of the problems involved in the design for the house of Mr. Francis S. McIlhenny two principal basic considerations were at once apparent. First, that the house was to be built upon a hill, and second, that the hill sloped towards the northeast, and that the outlook was directly to the north. These two points formed the root and foundation for the whole design. Regarding the question of orientation, it was decided that the solution of the problem lay in planning the house in such a way that the principal rooms would look out to the southeast, and this necessitated the creation of the parterre at that point. By this arrangement the living room, the hall and the writing room, on the first floor, and the owner's bedroom and the other two principal bedrooms on the second floor, obtained this valuable exposure. The question of view, to a large extent, was subordinated, but, by the location of the dining room, the bay looks directly at the view, the living room has two windows facing it, and the porch is so placed that it commands both the parterre and the view. In order to get the sun also into the dining room, the sunken garden was created, and while practical considerations make this a necessity, it brought about, as is almost universally the case, when such considerations are successfully handled, one of the pleasantest features of the design.

In fact, this process was followed throughout, and if the finished product has any merit at all, it is entirely due to the plan being born from its situation, and the elevations and outbuildings following as a logical sequence from the *parti* originally assumed. Of all elements of design, this seems to be the most important, and the one that, if faithfully, frankly and logically followed, produces in the end the most successful results. If the *parti* suits the ground, if the house is set at the right level, and if it is set in such a way, with regard to the points of the compass, that the sun gets into the principal rooms, that the places in which one lives outside are both cool in summer and warm in winter; everything else in the design seems to fall into its natural place and takes care of itself. The designer can find ready to his hand an answer to almost any question which may arise, if what he started with was right and suitable and if he can treat what he does afterwards with taste and a sense of the beautiful.

The functioning of a place of this kind is of the utmost importance. The property is about four acres in extent, and of this scarcely two are available for buildings, namely, those which show upon the plan, while the balance of the property extends to the northeast and further down the slope.

The two ramps at either side of the main gates to the forecourt, which show on the plan, but not in the plates, are an interesting illustration of

beauty growing out of necessity. They form a pleasant feature and, although built before the greenhouse, they now constitute the only connection between the garden functions of the place and that part of it which lies to the southeast of the sunken road.

Such matters, too often forgotten, show the importance of thinking and designing beforehand, while it is frequently the case that the owner takes the position that he wants from the architect only the design of a house; that the matter of the functioning of his house, and the functioning of the various things that go with it, are considerations entirely apart from the service to be expected from the architect, — the result being in so many instances that the outbuildings are located in a haphazard fashion and, frequently, in wrong and inaccessible places.

With regard to planting, practically all that shown on the plan has been done through co-operation between the owner and the architect, and here again, an opportunity exists which is too often neglected. When the designer creates blank spaces which exist in his mind as covered with vines, climbing roses, espalier fruit trees, or any other such pleasant appurtenances belonging to a country house, and those spaces are treated entirely differently and unsympathetically by an owner quite unconscious of the designer's conception, and aiming at a different object, thoroughly unsatisfactory results may be expected from the two opposing forces.

The levels were such that, in order to get the main first floor at an elevation equal to that of the parterre, formed by cutting out on one side and filling in on the other, this first floor level had to be set five feet lower than the level of the forecourt, thus necessitating the entrance loggia with its flight of steps leading from the front door to the actual entrance to the hall.

The original conception of the house was in the Italian feeling, shown by the first illustration in this article. Both for reasons of expense and because the owner did not feel that the Italian style was entirely suited to either his wants or the locality, it was decided to retain the plan but to change the exterior, as is shown by the following plate illustrations.

It would be quite impossible to classify the house as belonging to any style. Certainly the plan is English in feeling, inasmuch as it is both broken up and irregular, wandering about the property in a haphazard fashion, with no attempt at formality, considerations of orientation having taken precedence at every decision.

Fenestration of the house could be considered either French or Italian, though certain features — such as the entrance loggia — are quite slavishly Italian. As for French influence, — the bricks around the windows and the free use of brick as a color motive around the cornice and various other places might be said to be taken from the French, while the form of the roof is perhaps nearer French than anything else, but the fact of its being covered with shingles puts in an American touch.

An attempt has been made in presenting this house in the plates to arrange them serially, so that one is taken from the front — beginning at the entrance from the highway, through the forecourt, showing various views of the elements there, passing through the gate between the forecourt and the parterre to the southeast façade and, finally, into the hall and the fountain at the foot of the loggia steps.

One year elapsed between the broaching of the original proposition for designing this house and the breaking of ground for its construction. Another year elapsed while it was building, and at the present time the greenhouse and shed are under construction. All the planting, as shown on the plan, is in place, and the drawing of the pool in the text shows the proposed treatment for the parterre to the southeast, including the swimming pool and serpentine wall which bounds the southwest side of the parterre.

The owner having come to the very wise decision that he expects to live in the house for the rest of his natural life, proceeds slowly with the new features of the place, thereby getting his amusement as he goes along, and conditions such as these are undoubtedly ideal from the standpoint of the architect.

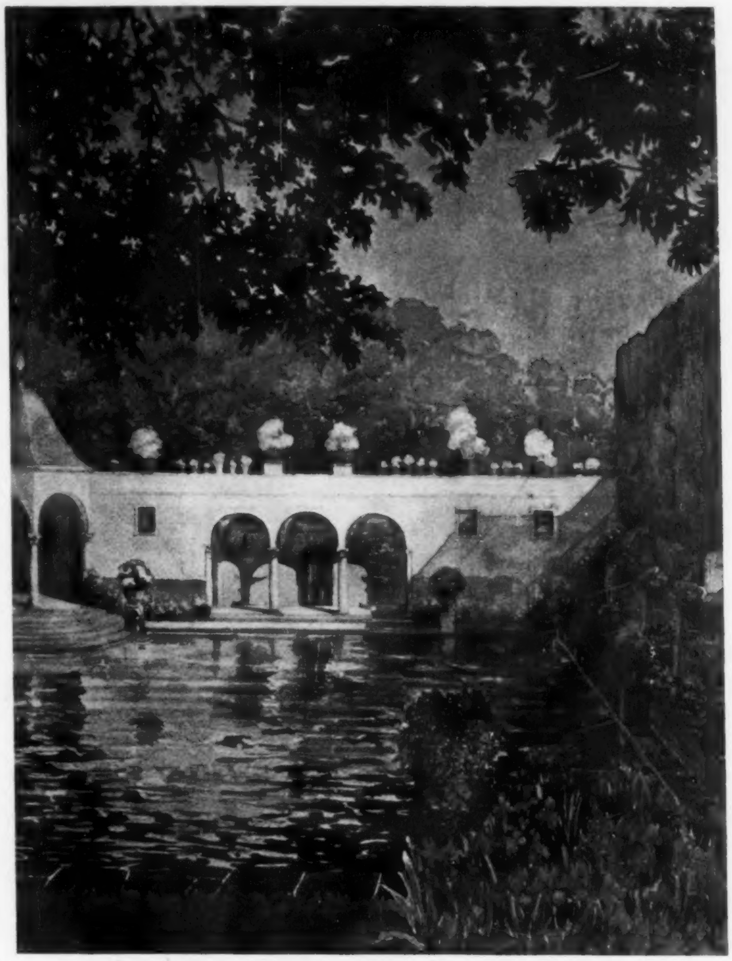
A new experiment was tried with regard to the treatment of the plaster walls in the porch and entrance loggia. The walls in these two places were sand-finish, and it was felt that color was desirable. In the loggia, three main colors were decided upon — yellow, brown and blue, all colors being very strong, and the brown about the tone of Spanish leather. Taking these three colors in three separate pots, the walls were covered in blocks, so that when they were first finished, they looked more like a ship that had been camouflaged than anything else. The colors were blended together by putting blue over the brown, brown over the blue, and both blue and brown over the yellow. A very successful result was thus obtained in which the color starts with yellow at the bottom, blending into brown half way up, and ending in a very rich blue on the vaulted ceiling, though there is no part of the surface that is all one color, as the three colors vary and intermingle through-

out the entire surface. The porch walls and ceiling are treated similarly except that the ceiling is a strong yellow, while the walls graduate up from yellow, through a pink orange, into a violet at the top.

The most careful study has been put upon the pool and its surroundings. The matter of landscape architecture is perhaps as much neglected in this country and in the present times, as it is important, and a general idea seems to exist that, compared to the house, it is relatively unimportant, and that the house being finished, there is little else to do.

Design is quite as important in landscape work as it is in architecture, except that it is more evanescent, more difficult to apprehend, and more rare.

Masses of growing things, whether they be trees, hedges or an open lawn, bear a relation to each other quite as important as the relation between the masses of architecture proper, and to suppose that the harmony, or lack of it, existing between the width of a terrace and the wall back of it, the size of an open space and the height of the features surrounding it, or any such elements of proportion — in short, design — are unimportant, is a most profound error.



Drawing of Pool and Surrounding Treatment on Grounds of Francis S. McIlhenny, Esq.

The main idea underlying the pool is that swimming pools are ordinarily considered as things of utility; something to be subordinated and to be put off in an out of the way corner of the property, while in this case an effort has been made to treat it as an important feature of the place with sufficient surroundings and of such proportion as to make it a thing of beauty as well as of utility.

Here, again, the needs of the problem suggest the treatment; the two rooms marked "men" and "women" on the plan are the dressing rooms which have ceilings 14 or 15 feet high, with wall spaces sufficient in size to foil and hold the three central arches; the belvidere at the left is raised, both to give a better view of the pool and the garden and to make it buttress more strongly this corner of the design; the scale is large, and owing to the woods which partly surround it and hang over it, it affords a capital place in which to spend a hot summer morning.

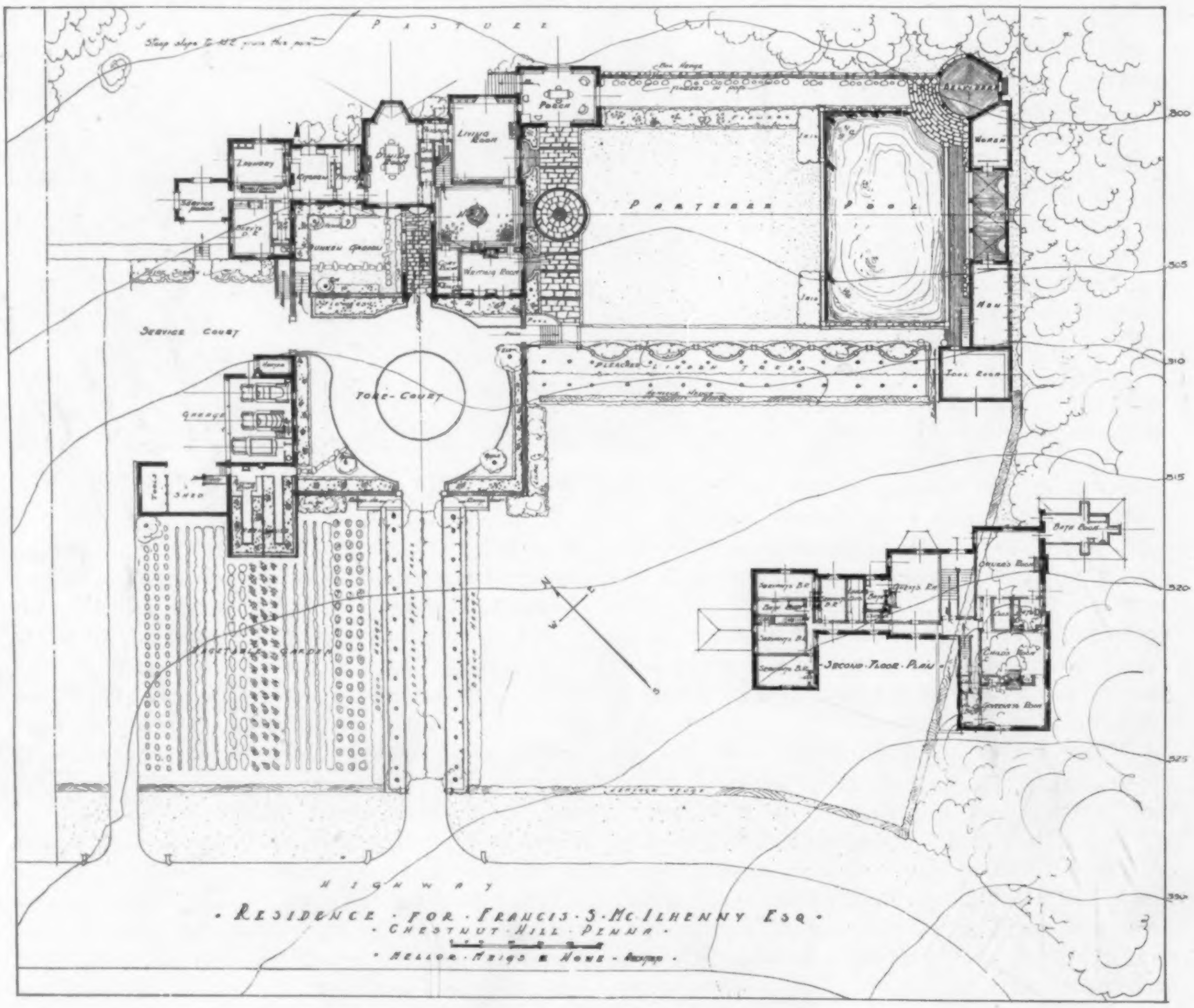
One porch can be habitable only at one time during the day; in this case there is a place to go both morning and afternoon, as the porch in connection with the house becomes shady at about three o'clock in the afternoon. The tool house is for the obvious purpose of containing the garden implements to be used about the parterre and the outside staircase is to enable the gardener to water the plants on the top of the building.

The circulation around the parterre as expressed by the paths has been carefully studied to be continuous, and to afford both variety and interest. The parterre is an element open to the northeast and closed on the other three sides with features of different heights; the house to the northwest, the serpentine wall, capped with pleached trees, to the southwest and the swimming pool buildings, backed up by the woods to the southeast. This circulation runs completely around, beginning with the main terrace of the house, through the porch, along the open side, across the circular steps of the belvidere, thence between the pool and its buildings, and finally back along the serpentine wall. The upper walk through the alley of pleached trees is an additional variation.

To sum up, there were two principal decisions taken before the design was really started, which

have created many of the most important features of the house, and the influence of which was so strong that it seems to extend into almost all the details. These were first, the orientation and, second, the level at which the main floor of the house was set.

The entire arrangement of the rooms, the placing of the forecourt, service court, parterre, vegetable garden, greenhouse and swimming pool, resulted from the former, while the sunken garden, entrance loggia, the feature of the parterre itself, and the garden gate with its steps and pool, all followed in logical sequence from the latter. Whether the results are good or bad is open to question, but certain it is that, from the standpoint of the designer, much more pleasure and benefit may be derived from the planning of a house, up from the ground, rather than down from a style.



Plan of Plot Showing also First and Second Floor Arrangement of House

House of Francis S. McIlhenny, Esq., Chestnut Hill, Philadelphia, Pa.

Mellor, Meigs & Howe, Architects

VIEW OF HOUSE FROM THE HIGHWAY

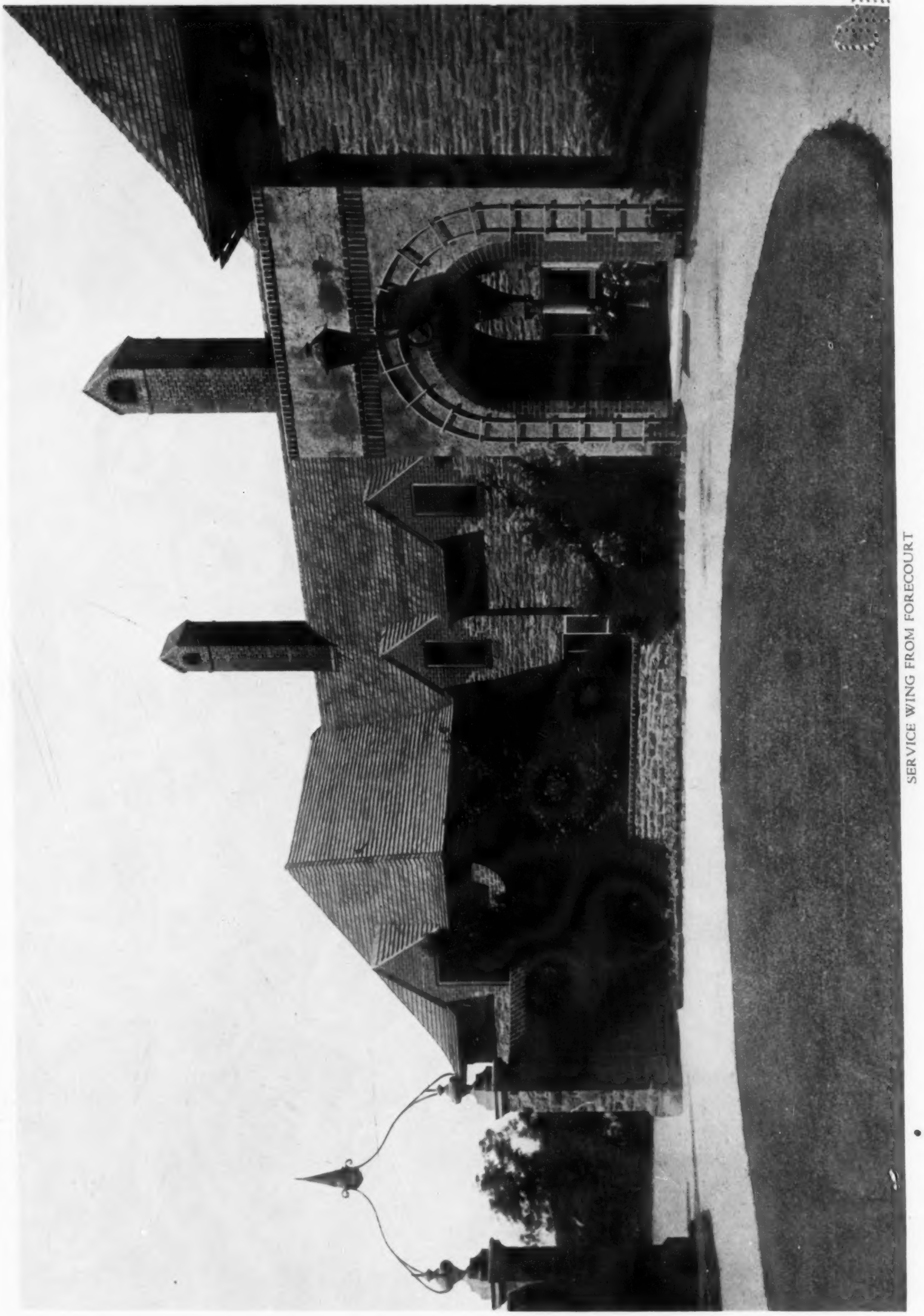
HOUSE OF FRANCIS S. McILHENNY, ESQ., CHESTNUT HILL, PHILADELPHIA, PA.

MELLOR, MEIGS & HOWE, ARCHITECTS

ENTRANCE AND GARDEN GATE FROM FORECOURT

HOUSE OF FRANCIS S. McILHENNY, ESQ., CHESTNUT HILL, PHILADELPHIA, PA.

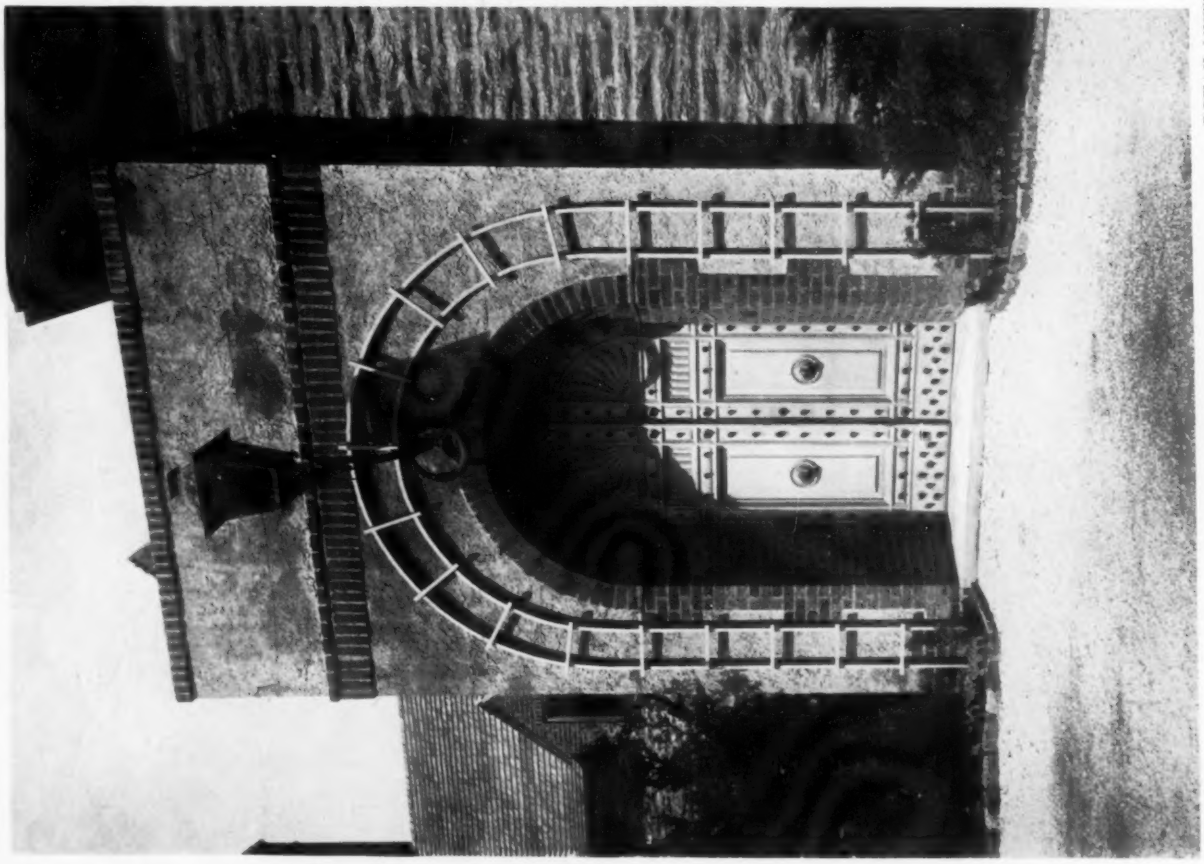
MELLOR, MEIGS & HOWE, ARCHITECTS



SERVICE WING FROM FORECOURT

HOUSE OF FRANCIS S. McILHENNY, ESQ., CHESTNUT HILL, PHILADELPHIA, PA.

MELLOR, MEIGS & HOWE, ARCHITECTS



DETAIL VIEWS OF ENTRANCE

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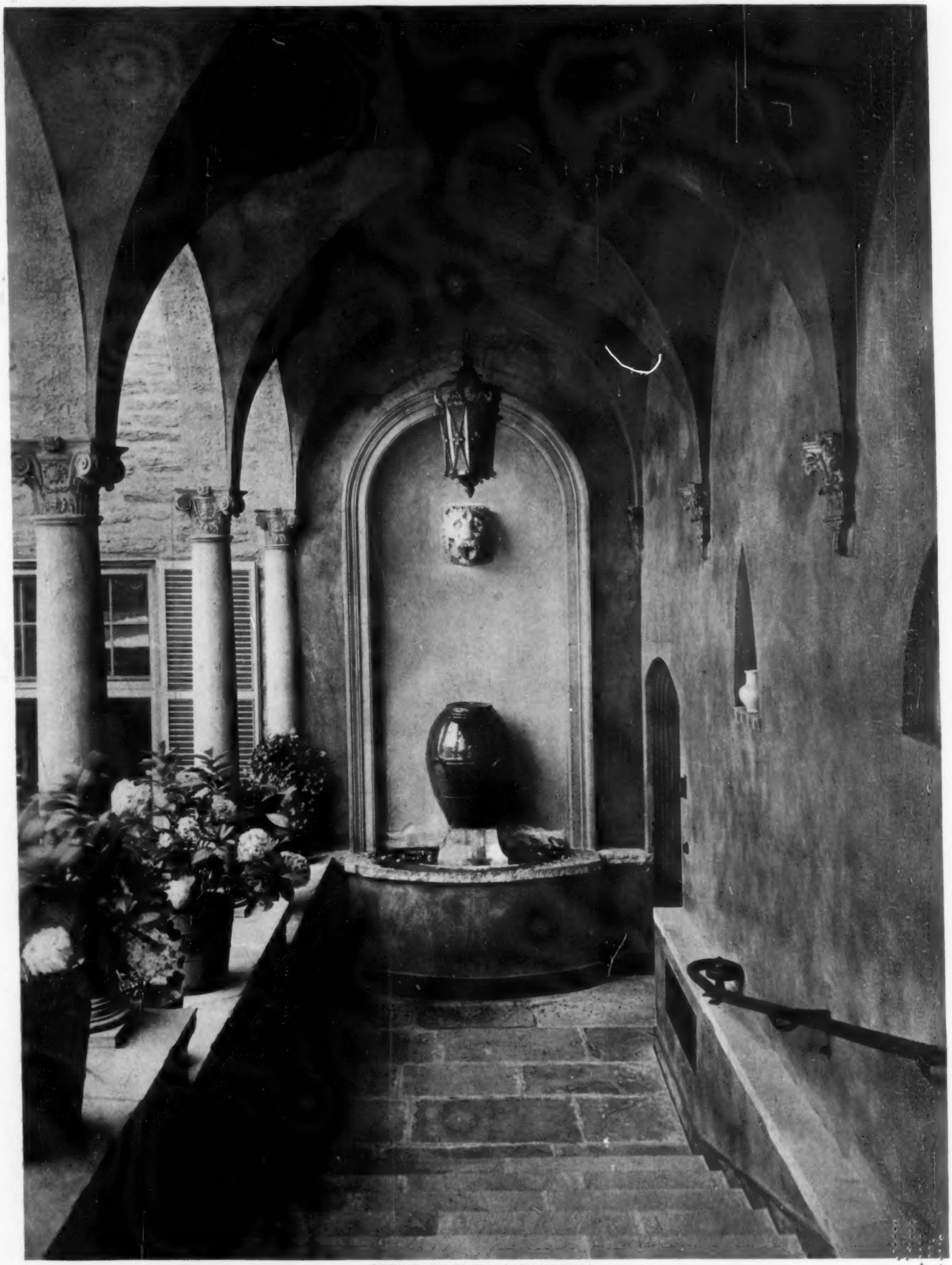
MELLOR, MEIGS & HOWE, ARCHITECTS



DETAIL OF ENTRANCE LOGGIA

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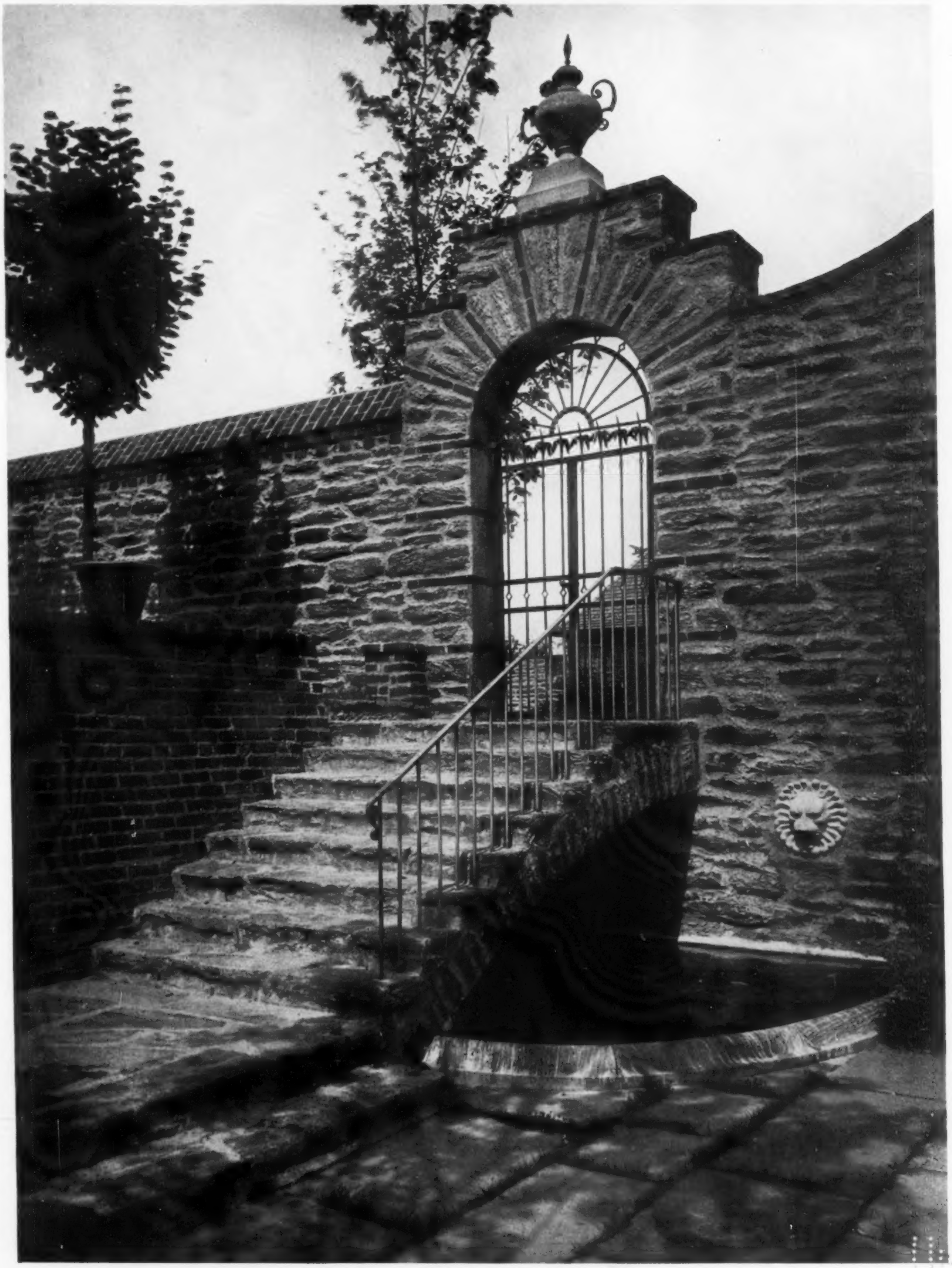
MELLOR, MEIGS & HOWE, ARCHITECTS

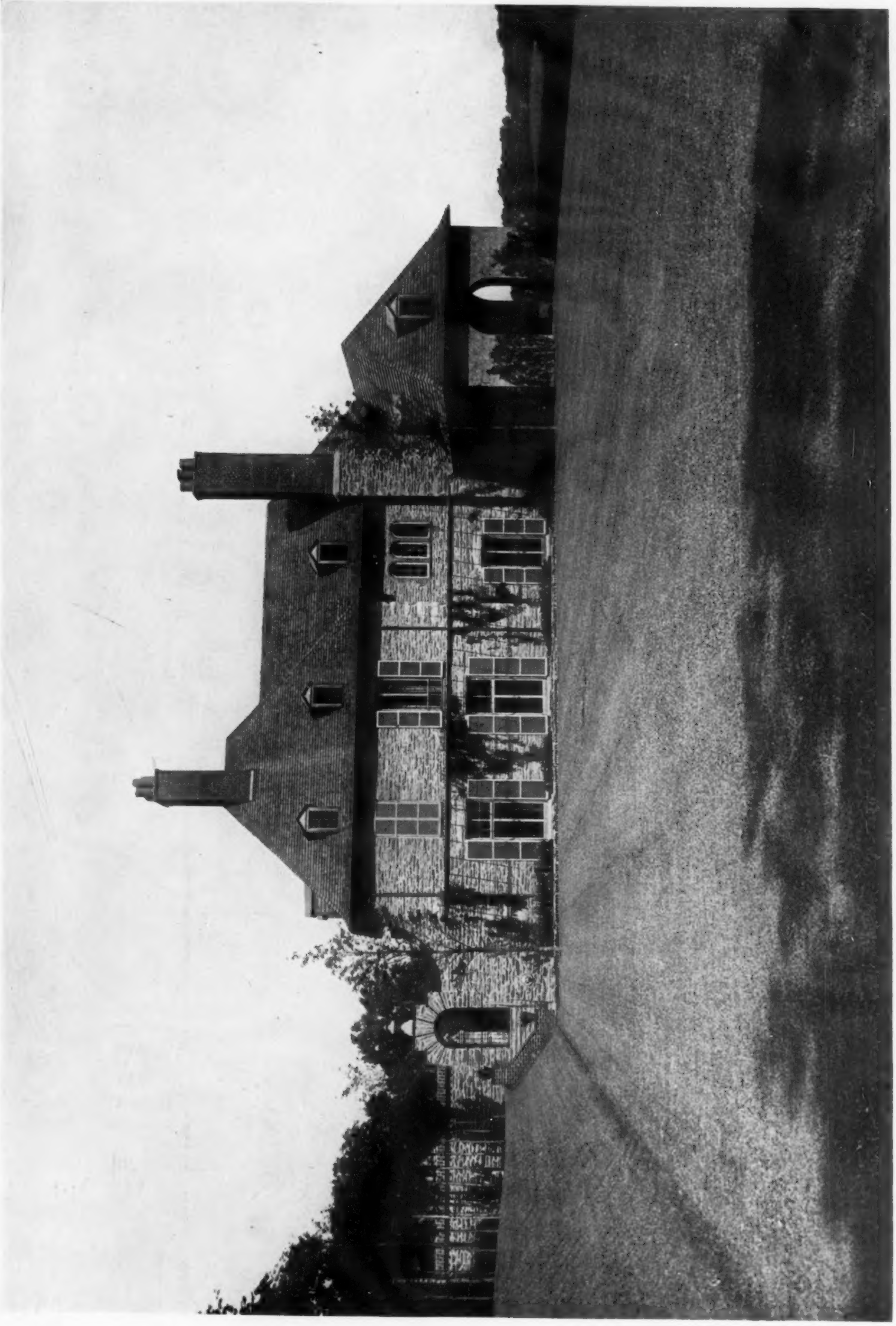


GARDEN GATE AND POOL

HOUSE OF FRANCIS S. McILHENNY, ESQ., CHESTNUT HILL, PHILADELPHIA, PA.

MELLOR, MEIGS & HOWE, ARCHITECTS

MU



SOUTHEAST FACADE FROM PARTERRE

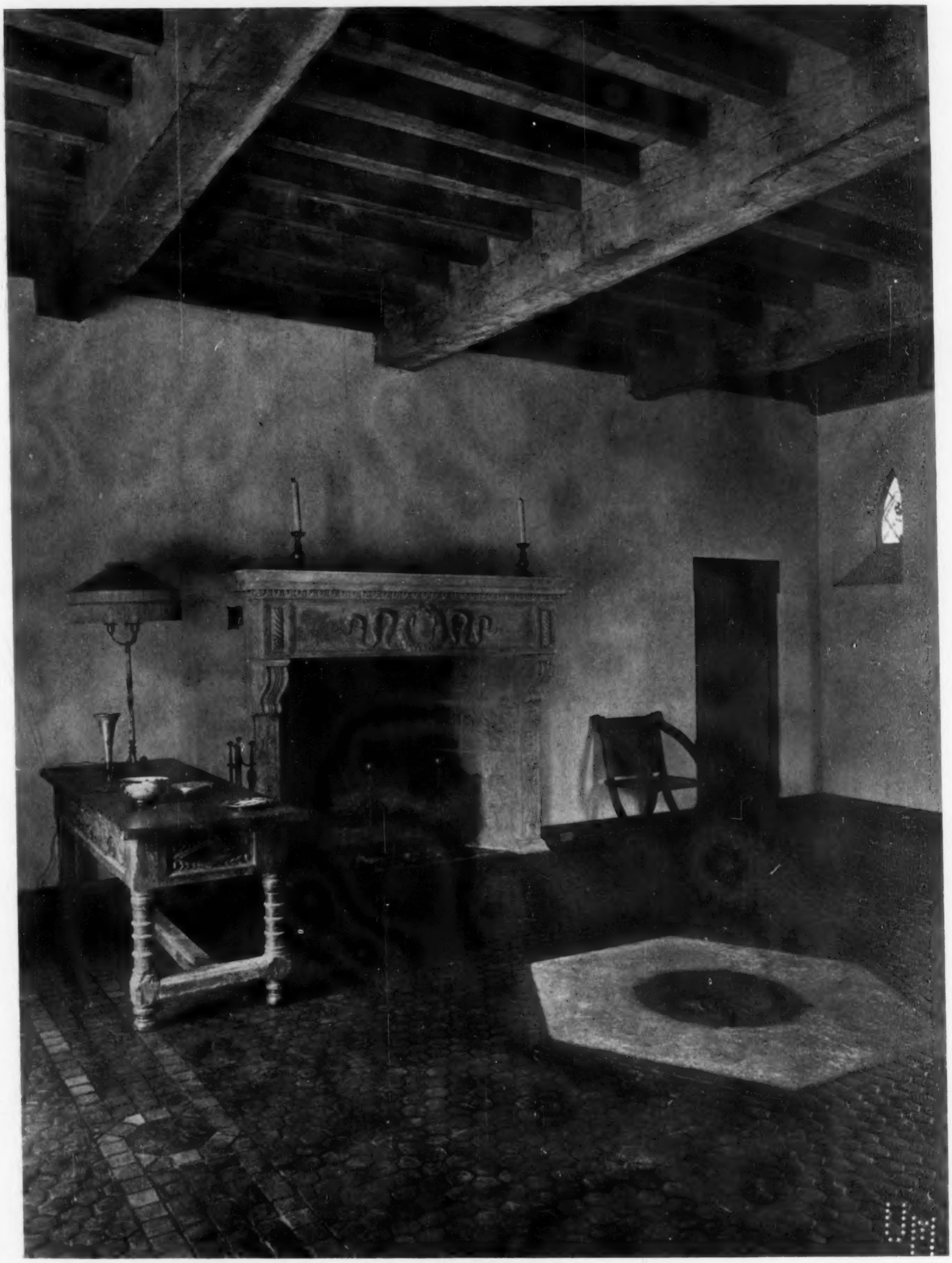
HOUSE OF FRANCIS S. MCILHENNY, ESQ., CHESTNUT HILL, PHILADELPHIA, PA.

MELLOR, MEIGS & HOWE, ARCHITECTS

DETAIL OF TERRACE ON SOUTHEAST FRONT

HOUSE OF FRANCIS S. McILHENNY, ESQ., CHESTNUT HILL, PHILADELPHIA, PA.

MELLOR, MEIGS & HOWE, ARCHITECTS

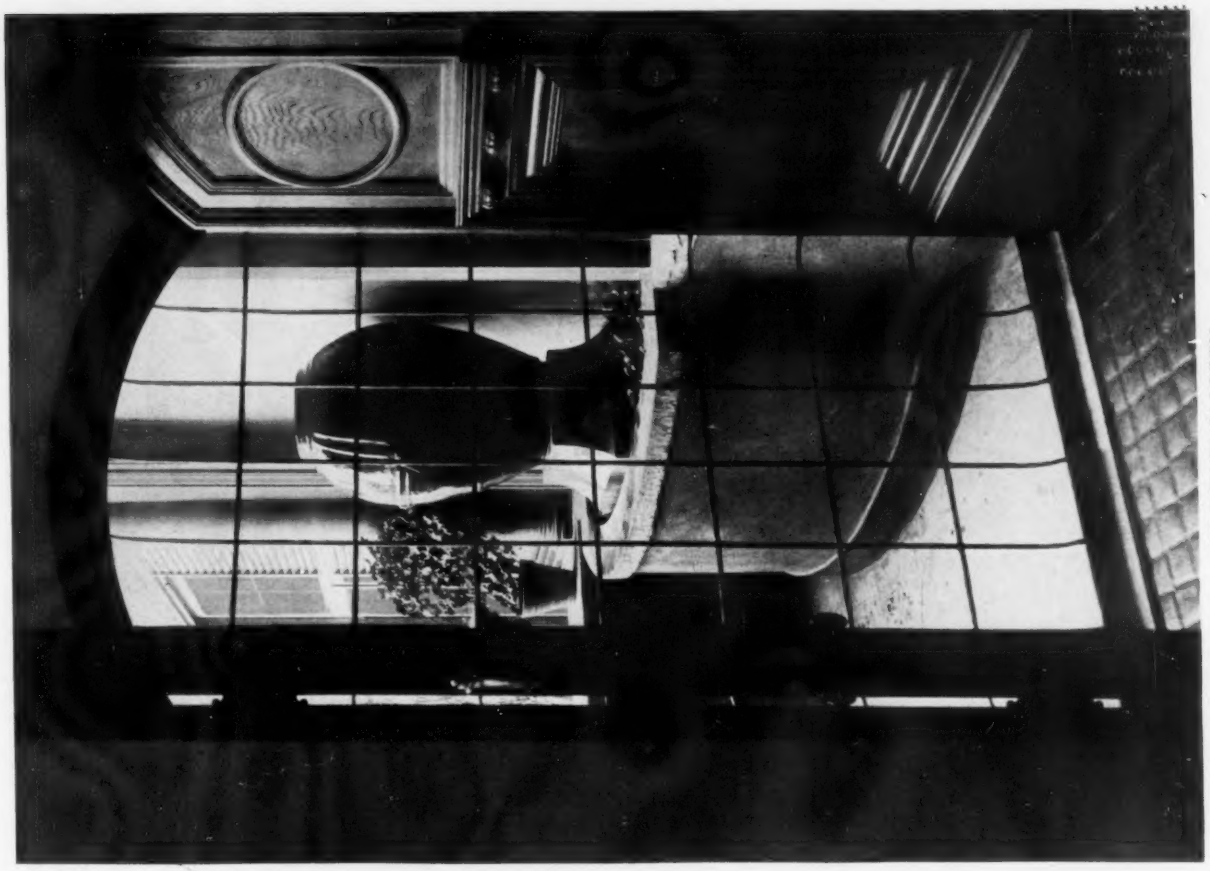


ENTRANCE HALL

HOUSE OF FRANCIS S. McILHENNY, ESQ., CHESTNUT HILL, PHILADELPHIA, PA.

MELLOR, MEIGS & HOWE, ARCHITECTS

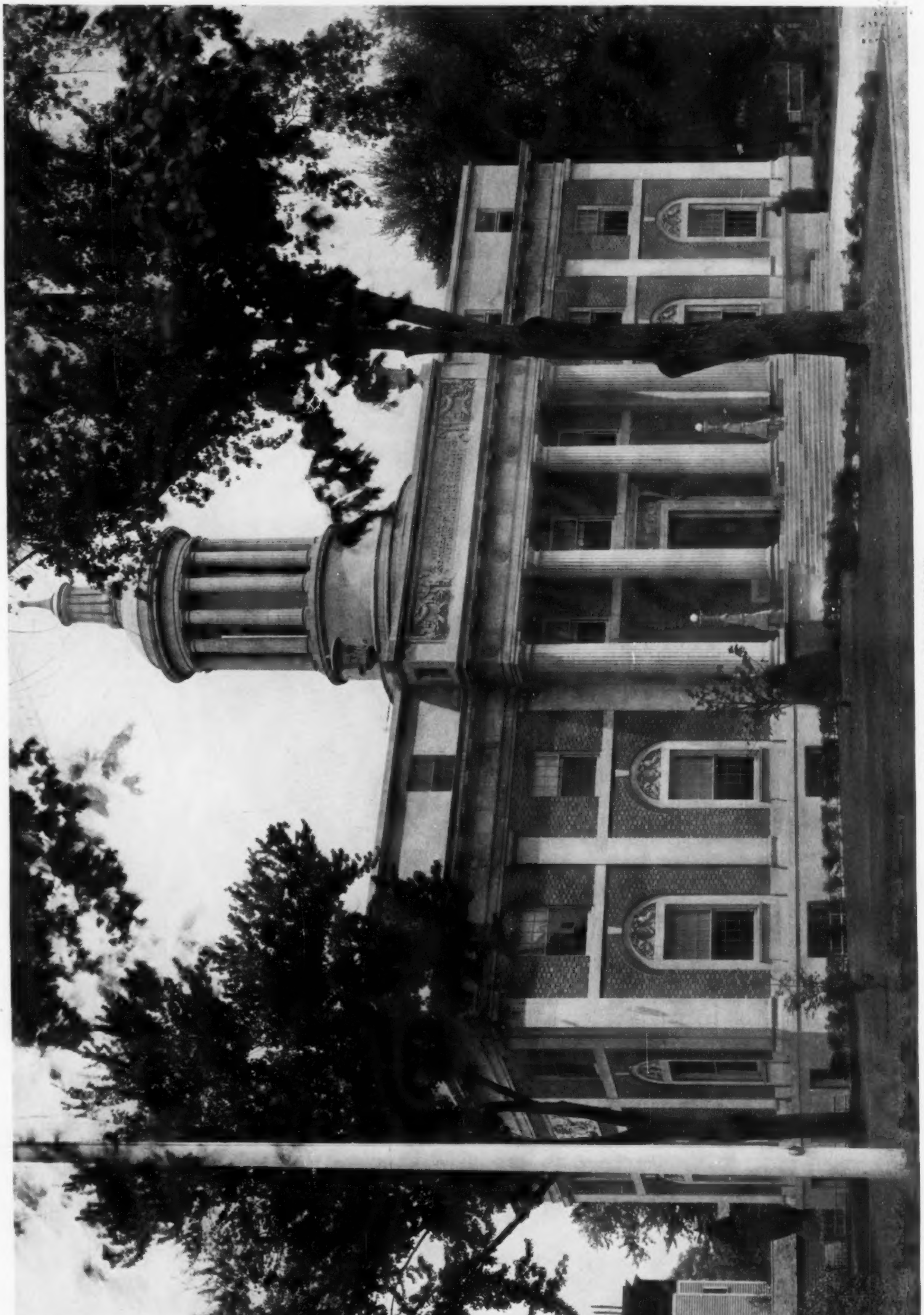
DETAIL OF GARDEN GATE



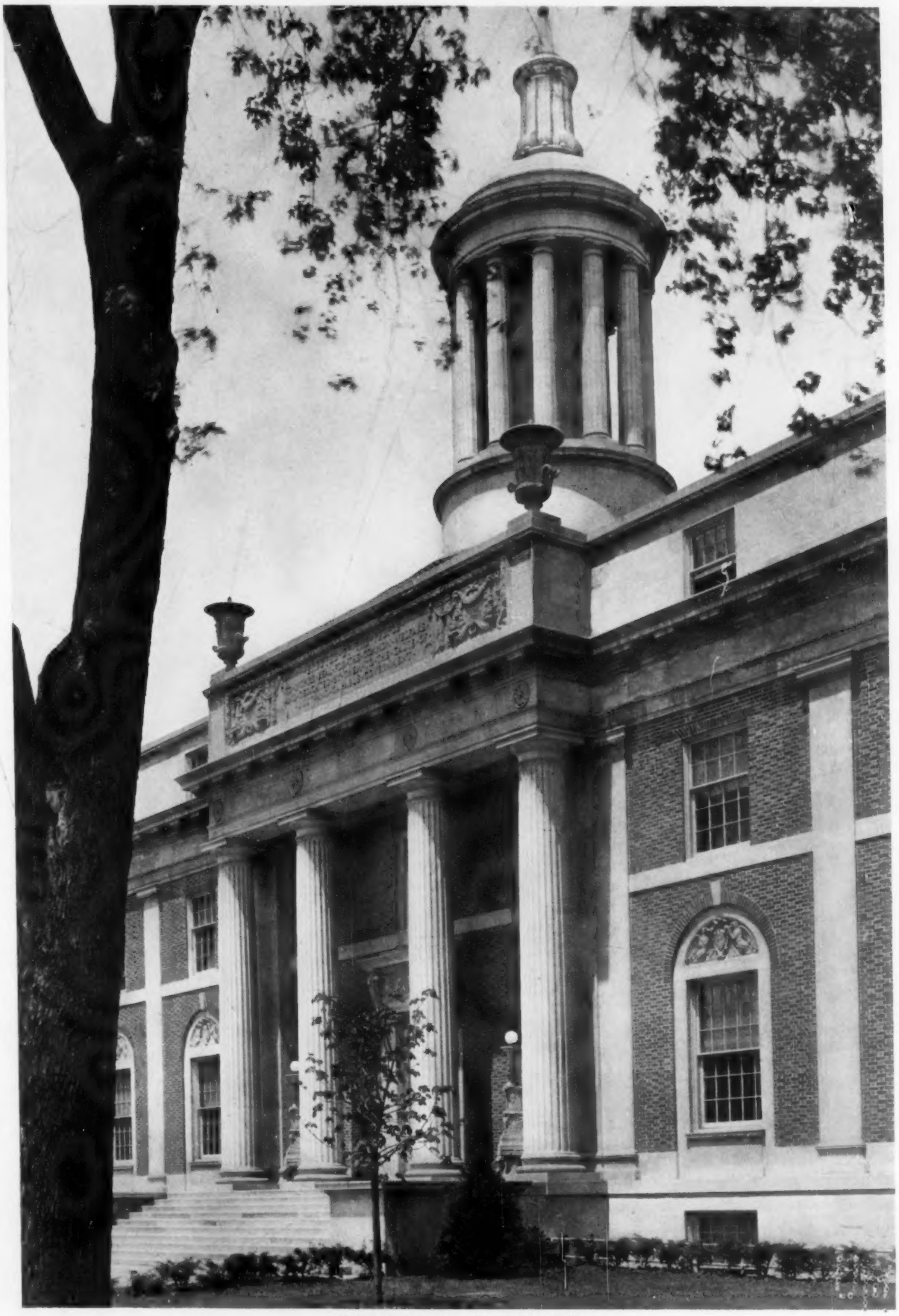
FOUNTAIN IN LOGGIA

HOUSE OF FRANCIS S. McILHENNY, ESQ., CHESTNUT HILL, PHILADELPHIA, PA.

MELLOR, MEIGS & HOWE, ARCHITECTS



GENERAL VIEW OF EXTERIOR
MUNICIPAL BUILDING, PLAINFIELD, NEW JERSEY
LAURENCE F. PECK, WM. LAWRENCE BOTTOMLEY
ASSOCIATE ARCHITECTS



DETAIL OF ENTRANCE PORTICO

MUNICIPAL BUILDING, PLAINFIELD, NEW JERSEY

LAURENCE F. PECK, WM. LAWRENCE BOTTOMLEY
ASSOCIATE ARCHITECTS

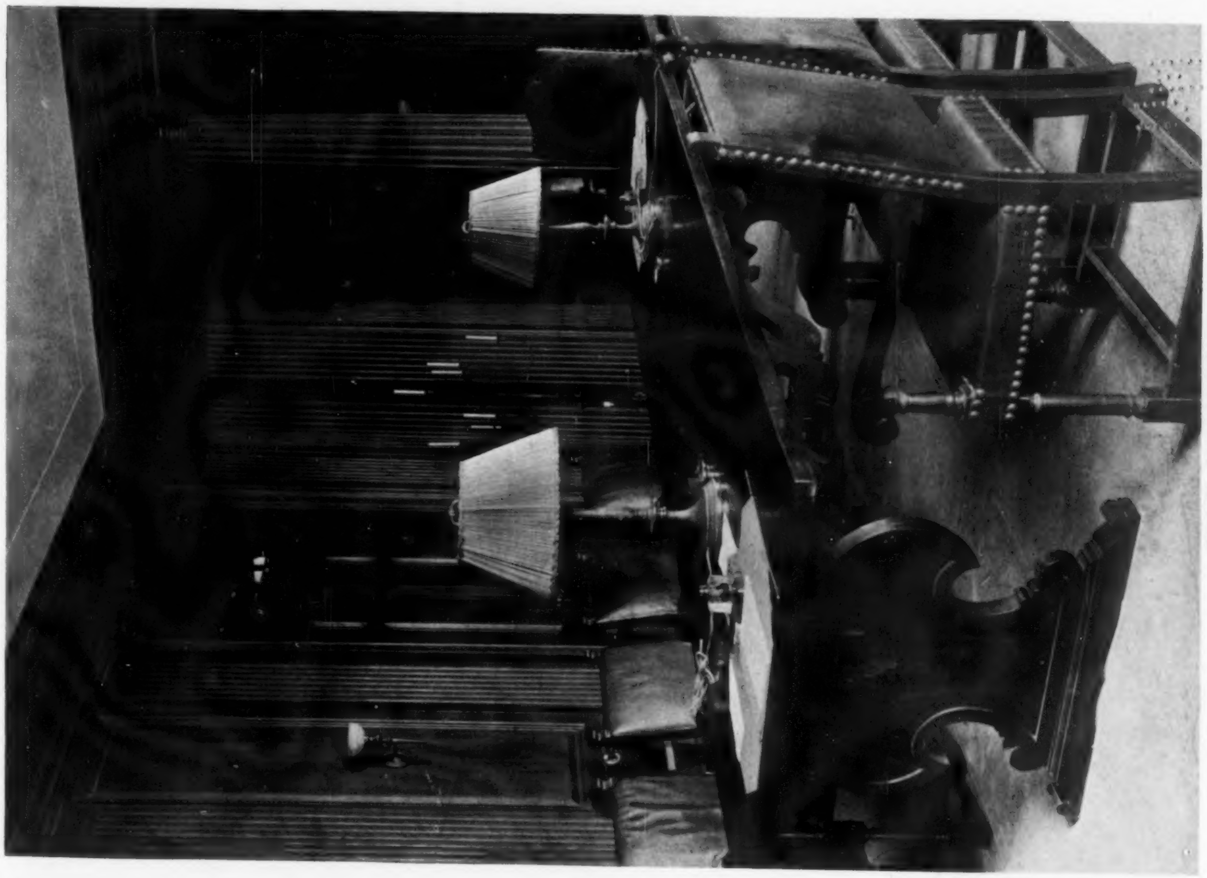
DETAIL OF END FACADE

DETAIL OF ENTRANCE DOORWAY

MUNICIPAL BUILDING, PLAINFIELD, NEW JERSEY

LAURENCE F. PECK, WM. LAWRENCE BOTTOMLEY
ASSOCIATE ARCHITECTS

MAIN HALL AND STAIRS



DETAIL OF LIBRARY

MUNICIPAL BUILDING, PLAINFIELD, NEW JERSEY

LAURENCE F. PECK, WM. LAWRENCE BOTTOMLEY
ASSOCIATE ARCHITECTS

MU

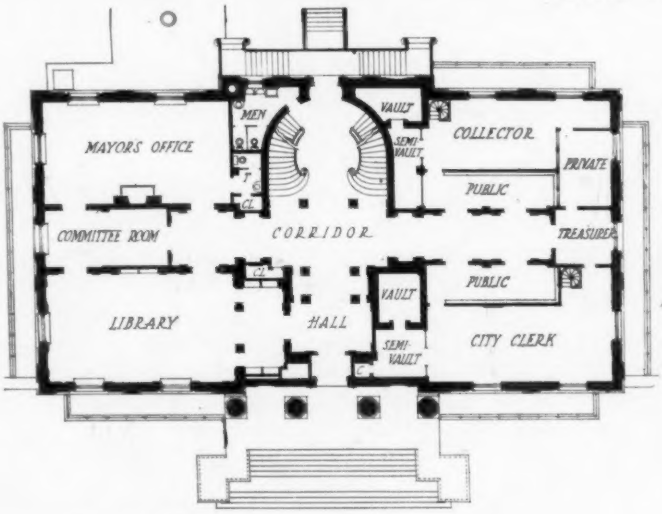
MANTEL IN MAYOR'S OFFICE

MUNICIPAL BUILDING, PLAINFIELD, NEW JERSEY

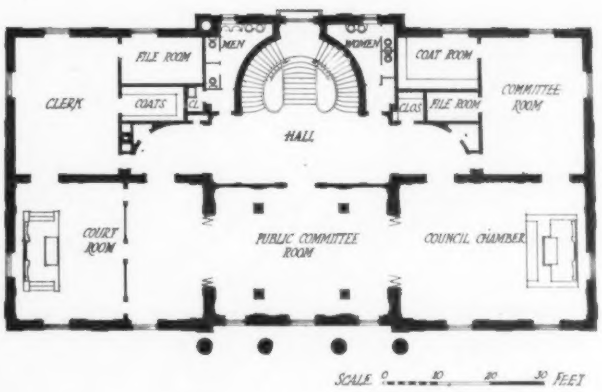
LAURENCE F. PECK, WM. LAWRENCE BOTTOMLEY
ASSOCIATE ARCHITECTS

MU

COURT ROOM



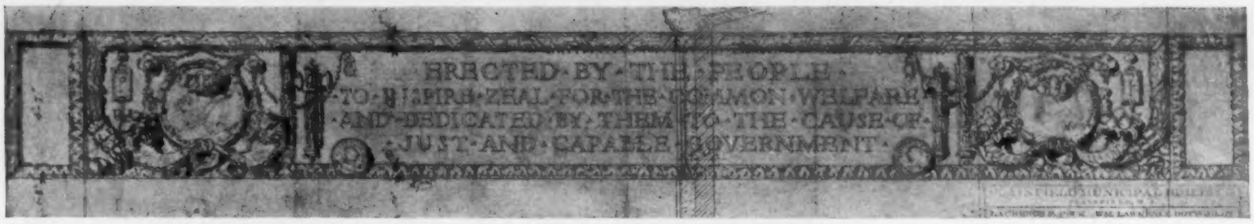
FIRST FLOOR PLAN



SECOND FLOOR PLAN

MUNICIPAL BUILDING, PLAINFIELD, NEW JERSEY

LAURENCE F. PECK, WM. LAWRENCE BOTTOMLEY
ASSOCIATE ARCHITECTS



The Municipal Building, Plainfield, N. J.

LAURENCE F. PECK, WM. LAWRENCE BOTTOMLEY, ASSOCIATE ARCHITECTS

By C. MATLACK PRICE

ALL who seriously follow the development of architecture in this country must hail with real appreciation the achievement of a small municipal building of good design. Not that such a building should constitute a particularly difficult problem, but because it is unfortunately too often involved with a variety of un-architectural complications. Too often this type of building falls into the hands of a political contractor, and the result is a painfully un-architectural building.

In other instances there has been insistence on "making a show," on erecting a pretentious imitation of a building which, if properly carried out, would far overrun the official appropriation voted to its design and construction.

The town of Plainfield, N. J. is fortunate in having secured, through competition, a building which is not only thoroughly architectural in its plan, but which is also thoroughly appropriate, in size and character, to the community for which it was designed.

In many ways, indeed, it might well be offered as an example to other towns, as an example of the practical application of architecture and good taste to a small public building.

We are by no means infallible in the design of our larger public buildings (as attested by many monstrous state capitols and the like), and in our small public buildings the meritorious example is the exception.

The selection of a stylistic expression for the Plainfield Municipal Building was a happy one — a frankly Americanized version of Italian Renaissance, skilfully modified to conform with the general simplicity and unaffectedness of the whole scheme.

View of Portico and Cupola

The mass is agreeable, with its dignified colonnaded cupola crowning the composition, and set so far forward as to escape the danger of partial eclipse in perspective. This cupola, studied as an integral part of the front elevation, is thus seen as a part of the front elevation, almost exactly as it appeared on the direct elevation drawing.

The columns of the portico are excellently dignified, and the needed interest of detail is added by the pleasantly Italian doorway and its flanking candelabra.

The stone used is the warm textured, rubbed "American travertine," with variegated brickwork in a range of color a little less pronounced than the usual "Harvard" brick.

A consistent but agreeable approach is laid in brick and cement, with a projected plan of simple planting which will be in accord with the simple character of the whole building.

Perhaps the only detrimental incident in the front elevation is seen in the windows of the super-story, a detail militating somewhat against the clean-cut dignity of the whole building.

On the rear elevation a detail of combined straightforwardness and subtlety is seen in the iron stair railings and stair-landing balcony above. This detail of well scaled ironwork is seldom amiss in any building of this sort which is carried out in brick and stone, and in this instance has added exactly the right note to the rear elevation of the building under consideration.

The plan is a counterpart, in consistency and simplicity, of

the exterior. The stairway ascends by two flights directly in line with the entrance, and to the left of the central lobby are placed the mayor's office and private rooms and the library (also available as a private meeting room).

The first floor color scheme is especially worthy of note, being both unusual and in excellent taste. No glaring white new walls proclaim to the visitor the inevitable newness of the building, or make him feel otherwise than that he has come into a place of standing associations.

The main hallway is done in subdued terra cotta colored panels, with trim in a color approximating that of dressed limestone. The mayor's office is carried out in soft brown walnut finished birch, with a distinct antique quality in the finish, and complementary to this is the dull blue of the wall color. The library, with its refined pilasters and built-in book shelves, is also in birch, with the same antique walnut finish, and for both these rooms the architects had special furniture made.

Detail of Exterior Lighting Standard

This introduction of special furniture is, unfortunately, seldom the case in similar buildings elsewhere, and the procedure in this instance should serve as a demonstration of the excellent result, as compared with the dismal installations of commonplace office furniture more frequently seen in public buildings.

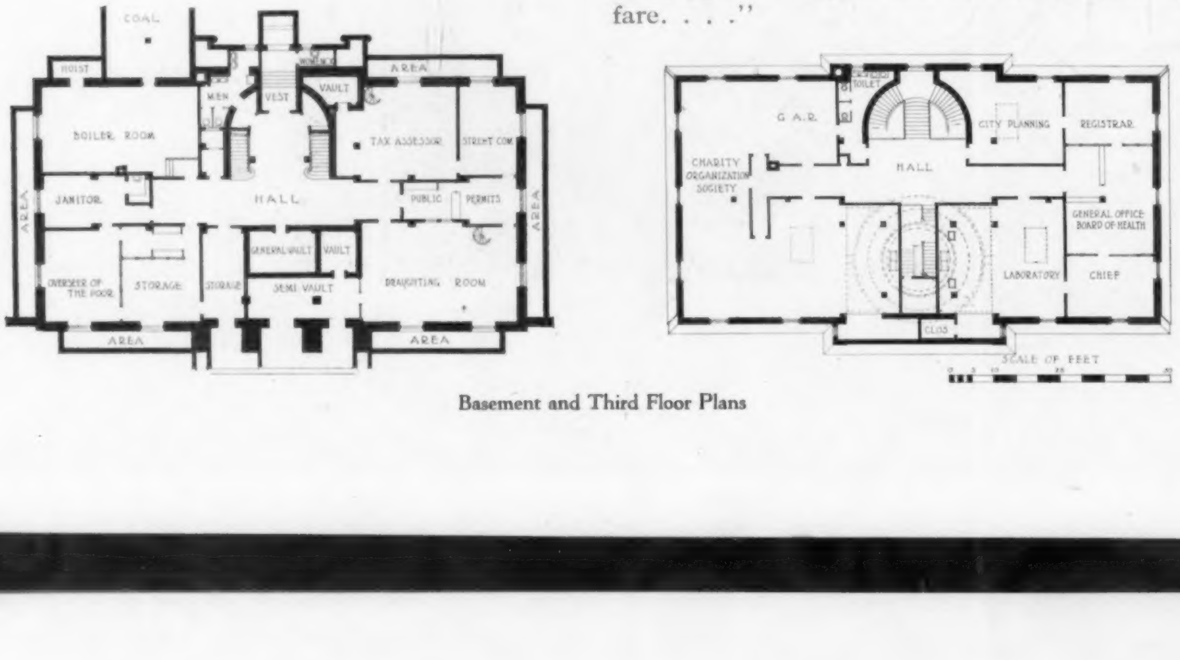
The second floor plan provides for a large "public committee room," at the front and center, located between the court room and the council room. All three rooms may be thrown into one in case of "overflow meetings," by means of folding partitions. As befits rooms intended for use rather than beauty, the color scheme is clean and dignified, all the panels and mouldings being done in three tones of ivory.

A study of the plans as reproduced will disclose other features of the arrangement, and the illustrations will visualize the general effect of the whole building. It is the purpose of these commentary remarks, rather, to sincerely acclaim the success (for Plainfield likes its new Municipal Building) attending a straightforward architectural handling of an essentially American problem.

The building is as good by reason of the things its architects did not do as it is because of the things they did do. A large part of their achievement lay in not trying to do too much. The result is a good example of a building in which all the material, as well as æsthetic and architectural possibilities, were recognized and fulfilled, and one in which the inevitable limitations did not impair the seeming freedom and sufficiency of the treatment.

It is, furthermore, a very ingenious and sympathetic study in free adaptation, being sufficiently Italian to possess a significant degree of architectural "manner," but not so Italian as to be in any sense un-American.

The whole character is well calculated to contribute largely toward the realization of the intent expressed in the inscription over the portico, which tells us (and will tell posterity) that this Plainfield Municipal Building was "erected by the people to inspire zeal for the common welfare. . . ."



Basement and Third Floor Plans

DEPARTMENT OF ENGINEERING & CONSTRUCTION

CHARLES A. WHITTEMORE, *Associate Editor*

A Comparison of Wood and of Concrete Piling

By A. C. TITCOMB

DURING the last fifteen years a number of engineering and contracting organizations have been built up through the development of the concrete piling industry. In certain localities the use of concrete piling has, to a large extent, lessened the use of wood piling which had been, up to that time, an almost universal method for foundations of buildings, bridges and other structures situated on unreliable soil, and for piers and wharfs. In some places, and for some purposes, wood piling has, and probably always will maintain its usefulness. There are certain merits in wood piling which have stood the test of time, and there are a great many features in concrete piling which are of importance.

There are several materials which are used for wood piling, and there are many kinds of concrete piling in existence. The length of this article will permit of only a brief description of the various kinds.

Most wood piles for building foundations are of spruce. Lengths can ordinarily be obtained up to 45 feet. For piles over that length, pine, chestnut or oak must be used. Spruce makes an excellent material as it is always tough enough to withstand driving, and the piles are uniformly straight. Both short and long leaf pine are also straight, but short leaf pine is liable to break on driving. Oak piles have great toughness, but are not always straight. Chestnut piles also are not straight and are liable to fracture on driving.

Concrete piles are of two general types: those which are cast before driving, and those which are made-in-place. Precast piles can be made any shape desired to suit the conditions of soil and of load. They must be reinforced to stand handling and driving, and in longer lengths so much reinforcement must be placed that the cost becomes a large factor. They are cast horizontally on the ground in wooden or metal forms. After setting two or three days they can be moved to a storage pile and must then be allowed to cure for three to five weeks before being driven into the ground. They are driven with a steam or drop hammer, with the addition of a powerful water jet. Fig. 1 shows some concrete piles which after being driven were excavated for an exposure test. Note the size as compared with the customary 8-inch or 10-inch wood pile.

Fig. 1. Concrete Piles Withdrawn for Exposure Test

One of the patented systems of concrete piling places a pre-cast concrete pile by the following method:

A cylindrical steel pipe with cast-iron point on the end is driven to the required penetration. A small quantity of soft concrete is placed in this pipe and on this, as a bed, a pre-moulded reinforced pile is lowered through the pipe which is then withdrawn, leaving the moulded pile in position. A quantity of thin grout poured into the form before it is withdrawn is sometimes of material benefit.

Of the made-in-place piles there are three types which have been used extensively for ten or more years. All of these piles are formed by forcing the form or mandrel into the ground and filling the hole thus formed with concrete.

One system uses a pile-forming apparatus consisting of a cylindrical steel casing and a core which fits inside the casing. The whole apparatus is driven to the required depth, after which the core is removed and a small amount of concrete is placed in the casing. The core is put back in the casing and the concrete is rammed, which may, in some soils, form

a bulb on the bottom of the pile. The ram is removed and the casing is filled with concrete, after which the casing is withdrawn.

In another type a collapsible tapered mandrel is covered by a shell made of sheet steel. This mandrel is driven into the ground and the mandrel is collapsed and withdrawn and the shell is filled with concrete.

In the third method a conical shaped, cast-iron point is placed at the lower end of a cylindrical steel tube that is driven to proper penetration, after which the form is filled to a sufficient height with the proper quantity of concrete to fill the pile hole to proper level. The form is then pulled out, and the concrete is forced down by its own weight and completely fills the hole to its compacted wall.

For all ordinary conditions of soil there would seem to be no preference for the use of wood or of concrete piling, as wood piles can be obtained up to 80 feet in length without undue delay or expense, and concrete piles can be driven to approximately the same depth.

Concrete piling, of at least two of the best known types, can be driven in soil in which it would be impossible to place a wooden pile. In many localities where piling is required, there are heavy fills composed of sand or gravel which become very firmly compacted after they have been in a few years. These fills, in many cases, overlie silt, peat or mud. In some cases the weight of the fill displaces the soft material under it, but more often borings will show that several feet of this soft, unreliable material still remains between the fill and the hard, underlying soil. This stratum of peat, silt or mud is usually very well compressed, but is not a proper material on which to rely for foundations of buildings of any weight, even though the depth of overlying fill is great, and it is, of course, requisite that foundation piling be carried through this fill and underlying stratum, hard though it may be, into firm soil.

Wood piles have, in many cases, been driven in compact fills of this kind; but it is my opinion that it is a dangerous practice on account of the fact that the driving is usually very hard, and the pile is liable to be split or broomed at the point before it has penetrated very far, and be rendered of absolutely no value. This damaged condition is hard to detect, and great care should be used in inspection where such conditions occur. The use of a strong water jet often helps the driving of wood piles when such soil conditions are encountered.

Another soil condition in which wood piles may give trouble, due to brooming, is one in which hard pan is overlaid by mud. Under a large group of buildings constructed near Boston several years ago a soil condition of this kind existed, and wood piles were driven under the most careful inspection. A large number of them were pulled out after driving, and it was found that the point of the pile had penetrated about one foot into the hard material, and that then had developed so much resistance in the hard material that the point could penetrate no farther. Driving did not stop, however, as proper penetration per blow, as indicated by the movement of that part of the pile above the ground, had not been obtained. Before the point of the pile had stopped moving it began to broom about one foot above the point, and the continued driving resulted in the shattering of the pile for a distance of about two feet or more, beginning at a point one foot above the lower end of the pile.

If, in either of the two cases above mentioned, concrete piles had been used, there would have been no difficulties, as the pile-forming apparatus used in placing concrete piles is usually so rugged and so heavy that proper penetration could have been obtained without damage.

If wood piles are cut off at such a level that they are always wet, they will not decay or otherwise deteriorate. It is very difficult to determine what the permanent water level will be unless the work is so situated that it is on tide water.

In many of our large cities the construction of subways and of trunk sewers and the extensive drilling of deep wells have cut off the flow of water, or have drained the surrounding territory in such a way that the water level is materially lowered, and the tops of the piles are left dry. In conditions of this kind, decay starts immediately, and in a very short time the pile is of no supporting value whatsoever.

In some foundation work which I recently observed, within 300 feet of the retaining wall built along the Boston side of the Charles River Basin, I noticed that the elevation of the water in excavations occasionally stood as low as grade three for several hours at a time, and for several days was no higher than grade four, and at times got as high as grade six, but never stood above this level except for a few hours after a heavy rain. The elevation of the water in the Charles River Basin is grade eight.

Occasionally it becomes necessary in alteration work in existing buildings to change materially the existing foundations due to the fact that by the alteration of the building the loads are to be materially increased, or due to the fact that poor foundations were originally put in and new ones became necessary.

In conditions of this kind, where piling is necessary, it is usually impossible to use wood piling on

account of the fact that enough head room cannot be obtained inside the building for the required length of wood piles, and it is necessary either to use concrete piling or to excavate to firm material by the use of caissons. By the use of one of the existing methods of concrete piling, piles over 60 feet long have been put down inside of a building where only 14 feet of head room was available.

An instance of this kind occurred in one of the cities of the Middle West where old foundations

Fig. 2. Steel Tube Forms for Concrete Piles Driven Under Low Head-Room

under the building failed during one of the floods on the Ohio River. New concrete piles were placed under the building by that method of made-in-place piling which consists in driving a steel pipe with a cast-iron point at its base to proper penetration, filling with concrete and withdrawing the pipe. The driving forms used on this work were put down in short sections and coupled together. After filling the entire tube with concrete, the form was withdrawn a few feet at a time and uncoupled as it came out.

In New York City several years ago, when the new subways were being constructed, it was necessary to carry the new line under the Post Office Building. In order to carry the immense weight of the building during construction, concrete piles were placed under all the walls and piers before any work was started, and there was only about 6 feet of head room available in which to put down these concrete piles. Thin steel tubes made in 2-foot lengths (Fig. 2), with a thin steel reinforcing band riveted on the outside at the top, and a thin steel reinforcing band riveted on the inside at the bottom and projecting 2 or 3 inches below the bottom of the pipe, were driven, one on top of the other, into the ground without any point on the lower end. The dirt inside the pile was taken out by the use of a small orange-peel bucket made to operate inside a circle 12 inches in diameter, and after excavation the pile was filled with concrete. Work of this kind is, of course, very expensive, and this method is used only where the head room is so limited that the other method previously described for concrete piling inside buildings cannot be used.

In wharf and pier work wood piles have been, and will probably continue to be, almost universally used, as they are cheaper and more suited for this type of construction than are concrete piles. If concrete piles are used, it is necessary that they be pre-cast piles, which necessarily requires a large amount of steel reinforcement, and, of course, requires a long time to manufacture and to cure properly.

In some parts of the Southern Atlantic coast the waters are infested with wood borers of two kinds,—the teredo and limnoria,—both of which attack wood piling.

In some places, where the water is very clear, wood piling will last only two or three years before it is completely destroyed. The limnoria and teredo only operate in clear water, and for this reason these borers are not a factor in the use of wood piling in the harbors of our large cities.

The creosoting of wood piling, if properly done, is an almost certain preventive against damage to wood piling from either of these insects. To be effectual, the creosoting of the pile must be done, not by applying with a brush, but in tanks under pressure, in order that the fluid may penetrate a great distance into the pile.

An objection to concrete piling for use in wharfs and piers is the action of freezing on concrete. The greatest amount of damage to concrete in sea water occurs between the high water and low water mark, and is caused by alternative freezing and thawing as the tide rises and falls. A dense concrete, made from carefully graded and selected aggregates with the addition of some waterproofing compound such as hydrated lime, in a measure prevents the deterioration of concrete in salt water.

There are certain instances where, owing to the nature of the soil, wood piles cannot be driven, and in these locations it is necessary to use concrete piles for wharf and pier construction.

In Florida there was constructed, about ten years ago, a concrete pile wharf at a location where the soil consisted of a small amount of silt and sand which overlay coral. It would have been impossible to drive wood piles into this coral reef, but concrete piles were driven into it a sufficient distance to provide support for the structure. In a great majority of cases, however, wood piles are the proper material to use for the support of wharfs and piers.

The most important factor in the consideration of these two types of foundation material is that of cost. Of course the relative cost of concrete and wood piling depends to a limited extent on the one hand on the availability of cement, sand and gravel, and on the other on the availability of wood piling. In all piling territory, however, the prices of all of these commodities are fairly constant except in special cases. If exceedingly long piles should be required in a locality some distance from the coast, where there were no wood piles at hand, rail shipments would be necessary and would be very costly. If sand and crushed stone or gravel had to be transported long distances by rail, and then had to be teamed to the site, the cost of concrete piling would be somewhat increased. In the main, however, the permanent water level determines the comparative cost.

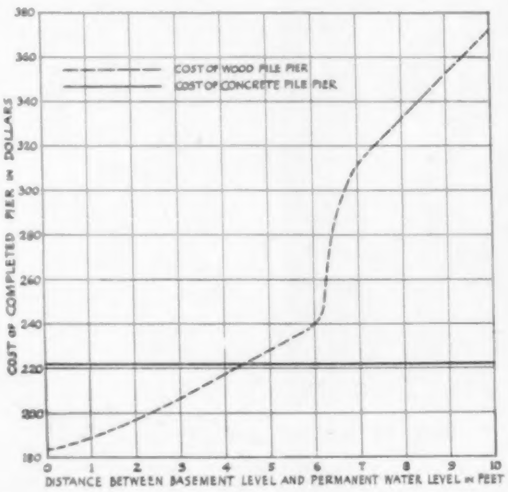


Fig. 3. Comparison of Cost Between Concrete and Wood Piling

If wood piles are cut off at such a level that they are entirely below the permanent water line, they will last indefinitely without the slightest decay; but if their tops are dry, they will decay very rapidly. Upon this fact depends the relative cost of the two methods. In a large majority of cases, where piling of any kind is to be used, the permanent water line is a considerable distance below the elevation of the basement floor, and it is necessary, if wood piling be used, to carry piers and walls down below the basement floor to the tops of the wood piles. This requires a large expenditure of time and money for excavation, shoring, sheet piling and pumping; also it is necessary to construct large concrete footings and carry deep walls and piers from the tops of the piles to basement level. By the use of concrete piling most of this is eliminated as the concrete piles can be brought to the elevation desired without reference to the water level, and require only a comparatively small capping.

The cost of one wood pile is very much less than the cost of one concrete pile of the same length, but due to its greater size the carrying capacity of a concrete pile is greater than that of a wood pile. The usual allowable safe load for the former is 30 tons, and for the latter, 10 tons.

To show a comparison in cost of the two types of piling, I have estimated the cost at current prices prevailing in Boston, of a typical pier carrying a load of 120 tons, using in one case wood and in the other case concrete piling, and have shown graphically the increasing cost of wood piling as the depth of permanent water level below floor elevation increases. I have assumed the length of piles as 30 feet. The rapid increase in cost of wood piling, due to a variation in water level between 6 and 7 feet, is caused by the necessity of using shoring and sheathing from this point on.

In all parts of construction work careful inspection and good workmanship are necessary for the success of the undertaking. This is particularly of importance in piling work, as poor piling is usually not discovered except by the settlement of the building which it is intended to support.

I believe that concrete piling should not be used for the support of any structure, unless the architect requires the use of one of the approved methods that have been extensively tried out over a period of years; and further, that he requires piling to be placed by an organization of whose integrity and workmanship there is no question, and as an additional check on the manner in which the work is to be done he should supplement his care in the selection of the type of piling, and of the contractor, by skilled inspection from his own office. Failures of concrete piling have been very few, but in the few which have occurred the cause of the failure has been either an attempt by an inexperienced organization to place an untried system of piling or poor workmanship and inspection during the progress of the work.

Wood piling, while requiring a usual amount of inspection and workmanship, does not require the extraordinary care which concrete piling requires except in a few unusual cases.

Types of Reinforced Concrete Floor Construction

By BURTIS BROWN, C. E.

WITH the ever-increasing use of reinforced concrete as a building material, there are constantly coming to the architect's mind questions as to the best method of layout for the particular work in hand. Should a simple slab between beams be used or would one of the more complicated flat slab systems be specified?

Let us look at some of the advantages of the more prominent methods available to-day.

(*A*) Concrete Slab between Steel Beams

One of the first methods that was used to any extent in large building operations was the simple, reinforced concrete slab supported on structural steel beams. This system had the advantage of being very rapid in construction. The steel beams gave an excellent opportunity to hang the wood centering and it was economical in form lumber, as no shoring or studs were necessary.

It does, however, require much structural steel work at the fabricating shop and on the job, besides in a first-class building all of the steel beam (bottom of flange as well as top) must be fireproofed, so the next step was the elimination of the structural steel and the substitution of reinforced concrete beams for steel.

(*B*) Beam and Girder Design

The spans for the slabs, beams and girders for a reinforced concrete frame are about the same as for steel skeleton construction. This method is shown in Fig. B. The slab is designed just the same as in (A), but there is an advantage in using concrete for the beams and girders. The amount of reinforcement in beams of this kind is less than one-half that required for an I beam that sustains the same load. In a first-class building it is necessary to fireproof the structural steel to protect it from buckling and collapse in case of fire. With the steel frame building the top flange of the steel beam carries all the compression, while the upper part of the concrete is simply protecting material. However, there is usually a sufficient amount of concrete in this fireproofing to sustain all the compression, because in the complete concrete structure the concrete slab acts in compression with the top part of the beam.

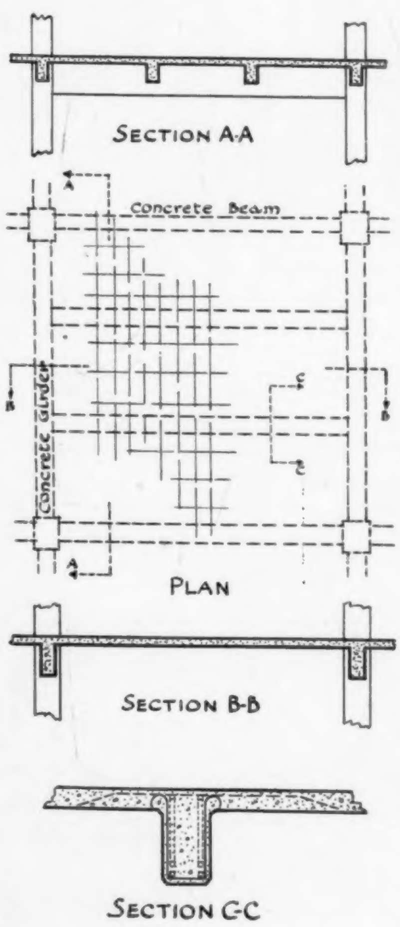


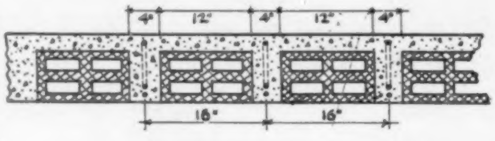
Fig. B

Sometimes the plaster is placed directly on the underside of the slab, beams and girders, allowing the larger members to show in the finished room; but in the better buildings a suspended ceiling is built, thus giving a smooth surface throughout. The beam and girder system has many stanch advocates, as the method of calculation is more direct than some of the systems described later. The steel is much easier to place and inspect, and the longer use of the system has enabled contractors to devise economical methods in form work.

(*C*) Concrete Joist and Terra-Cotta Tile

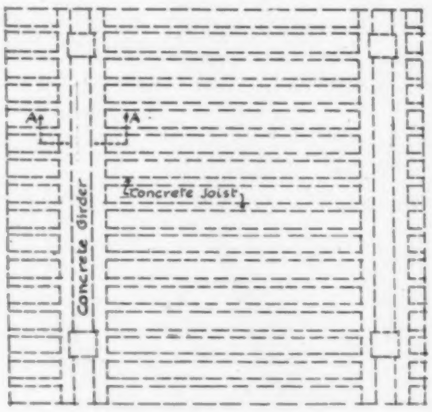
With the desire to obtain a flat ceiling without the expense of the suspended ceiling, and to save the loss of headroom, there was developed the concrete joist and terra-cotta tile system as shown in Fig. C. Usually the tiles are 12 inches wide and they vary in height from 4 inches by 2-inch increments to 12 inches. These tiles are set on the forms with a 4-inch or 5-inch space between rows, and the sides of the tile used to form the sides of the concrete joist. Steel reinforcement of the required amount to carry the desired load is placed in the joist. A few buildings were constructed where the top of the tile formed the top of the floor, but much more commonly a concrete slab from 2 inches to 4 inches thick is poured at the same time as the joist. Also a small amount of steel is placed in the slab. Wire fabric is excellent reinforcement for this work. This slab may be given a terrazzo or granolithic finish or a wood wearing floor laid above it, whichever best serves the use of the building. The hollow space in the tile can be used for pipe or conduit ducts. Besides the advantage mentioned above, this method does not require so many forms. The tile is sufficiently strong to support itself if a small bearing for it is allowed on the form under the joist.

In plastering a ceiling of these combined materials the outlines of the tile and joist are very noticeable, which detracts from the appearance of a fine building. By treating the surface before plastering this can be avoided. There is now a tile on the market which has a flange extending under the joist so the plaster is on the tile throughout, thus eliminating the objection just mentioned.

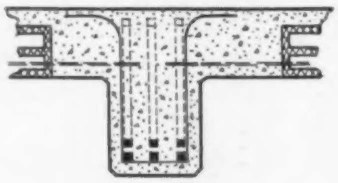


CONCRETE JOISTS AND TERRA COTTA

The dead weight of this type is not so great as in the methods previously described and therefor the combination floor is well adapted to public buildings, hospitals, hotels and schools.



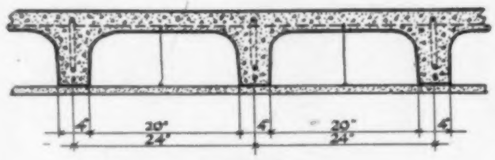
PLAN



SECTION A-A
Fig. C

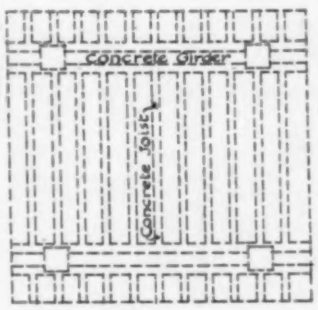
(*D*) Concrete Joist and Pans

The tile just described does have some dead weight and it is expensive in some parts of the country due to high transportation charges, so the manufacturers of sheet metal specialties devised a pan, so-called, to replace the tile. The spacing of the joist is usually 24 inches, center to center, although 36-inch centers are obtainable and the depth of pan varies from 4 to 12 inches. With the 24-inch spacing of joists as shown in Fig. D the pan width is usually 19 inches at the base and slants in toward the top, making the joist wider in the compression area, — an advantage in strength, — and it allows the form to be removed more easily. The sloping sides also permit the pans to be "nested" for shipment.



SECTION
CONCRETE JOISTS AND PANS

In buildings where there is much moisture, such as laundries, the pans should never be left in place, as the drip from moisture condensing on the ceiling is destructive, but there are types of buildings where this objection does not obtain. These ceilings are not usually things of beauty, even when painted.



PLAN
Fig. D

The dead weight of this system is small and the forms economical because of repeated uses. The space between joists permits pipes and conduits to be easily located. With both of the joist systems it is necessary to build large beams or girders to carry the loads from the ends of the joist to the columns or walls. Joists are adapted to spans from 16 to 30 feet.

(*E*) Unit System

In some locations the "unit system" best serves the use of the owner. It might well be termed "concrete lumber" method because the individual concrete members are moulded separately on the ground and later hoisted into place.

This is an excellent system to use in the winter as the members may be poured in a shed where there is heat. There is a saving in form lumber. It is best adapted to locations where there is much vacant land, on which to store the members while hardening; for this reason it is not satisfactory for city buildings where storage space is limited. The advantage of continuity is lost, and moments for these beams must be calculated 50 per cent higher than in a monolithic system. Besides the beams have to be deeper, as the slab in the monolithic system helps to carry the compressive stresses of the beam.

Sometimes the beams and girders are poured in moulds on the ground, allowed to harden and then hoisted into place. Stirrups are arranged to project. Wood slab forms are placed between the concrete beams and the slab poured in place, as in method "A" and "B." The stirrups are a part of both the beam and the slab, and make a very efficient tie between these two members, as tests at Harvard University laboratory have shown.

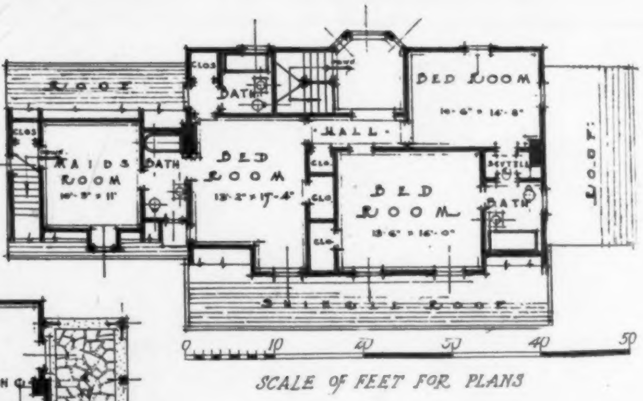
The types of floor construction previously described are simply copies of the methods used in the framing of wood or steel. A distinctly new type was introduced when the flat slab or "mushroom" system was designed. This method possesses advantages both for loading and spacing of columns not found in any other system and will be discussed in a later issue.

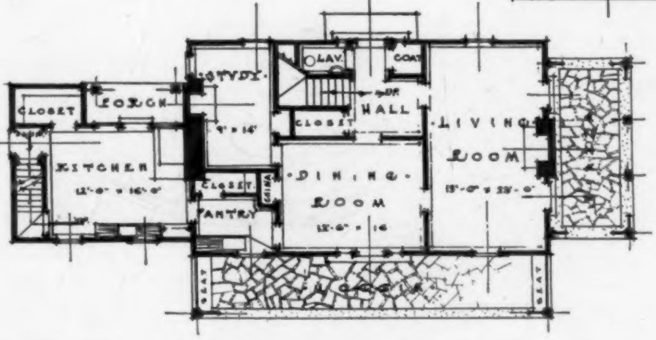
A Small Country House at Rockford, Ill.

THE RESIDENCE OF DONALD FERGUSON, ESQ.

AYMAR EMBURY II, ARCHITECT; LEWIS E. WELSH, ASSOCIATE

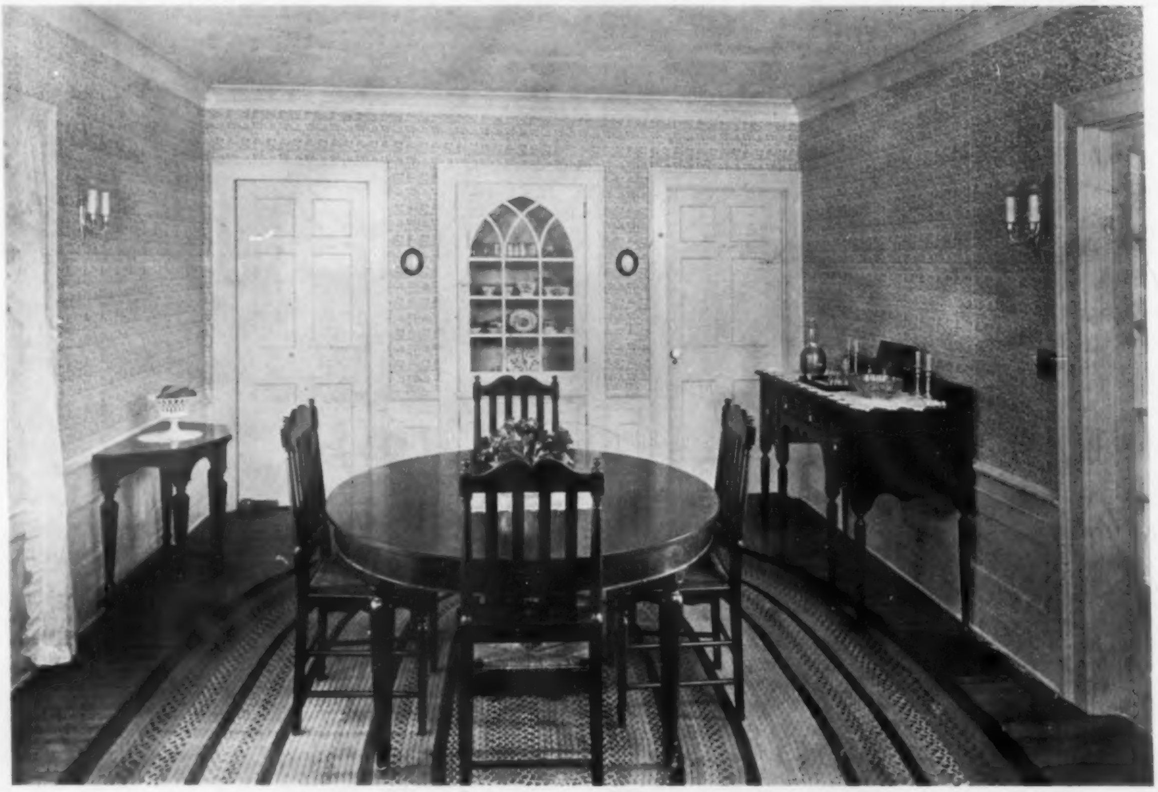
GENERAL VIEW OF
ENTRANCE FRONT





FIRST AND SECOND FLOOR PLANS

VIEW OF GARDEN SIDE



VIEW OF DINING ROOM

HOUSE OF DONALD FERGUSON, ESQ., ROCKFORD, ILL.

AYMAR EMBURY II, ARCHITECT; LEWIS E. WELSH, ASSOCIATE

The Colonial Precedent in Minor Domestic Architecture

By GEORGE F. MARLOWE, ARCHITECT

IT is said that it was the attractive physical qualities of the English garden villages which enabled John Burns to secure the passage of the Housing and Town Planning Act of 1909. Much that appeals to us in this and other modern English architecture is due to an insistence on the vernacular, the "regional" type; a quality, excepting in the better class of work and in a few fortunate localities, almost entirely lacking in our own residential communities.

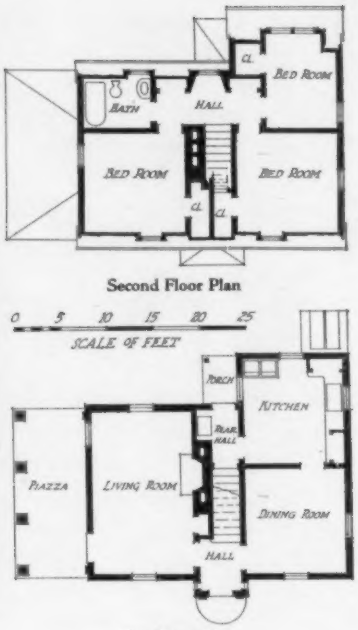
For perfectly obvious reasons, the Colonial or Georgian is now generally accepted as our regional type, at least throughout the East and Middle West. The advantages of the "style" from the practical standpoint seem so apparent as scarcely to need repeating, yet they are frequently overlooked.

A marked characteristic of the Colonial being simplicity of plan and consequently of roof design, it fulfills at the start the fundamental principles of economical construction. Conversely, any attempt to apply to a severely simple plan a style habitually associated with complexity in planning, elevation and detail is hopeless from the beginning.

Both materials and methods of construction at the present time are practically identical with those of the middle and late Colonial periods, the sole difference being in modifications in methods of manufacturing and assembling, due to the introduction of new and improved machinery and labor-saving devices. Hence we are working in a style with the materials and methods to which, and to which alone, the very creation of the style and all its characteristics was solely due, and any attempt to design in any style which was the outgrowth of totally different materials and methods is obviously futile.

With the exception of certain details, such as hardware, lighting fixtures, and the added conveniences of heating and plumbing, every part of the modern house is substantially the same now as in the eighteenth century, for with the advent of the planing mill and tools for running mouldings, materials and construction methods came into use differing in no essential from those in use at the present time. Bricks may be made with the aid of machinery instead of wholly by hand, mouldings run in the mill instead of by hand tools, and sash hung with weights instead of with old-fashioned catches; but bricks, mouldings and double-hung sash turned out by machinery are all as good, or better, despite the purists, than those made by the old-fashioned methods, and all are easily obtained and used in the most every-day work. On the other hand, the imitation of hand hewn timber or other archaic materials, which deceives no one, is not only in bad taste but bad construction, and to hew it by hand would be just as absurd as to insist on wearing hand-knit underwear or stockings, cloth made upon a hand loom, or shoes made entirely in the manner of the old bench shoemakers. Doors, windows, gutters and other parts of almost the cheapest form to be bought in the market ready made, are admirably adapted to the details of the type. Even the much despised stock Colonial column may be made to serve very well for the less exacting requirements of cheaper work. While the nicer refinements are unfortunately lacking in the stock mouldings of the finish mills, after all, with the exception of a doorway and such interior finish as mantels, stair details, etc., with a little care and a real knowledge of the essentials, practically all the characteristics of the style, may, if necessary, be obtained without the use of a single specially made detail. This is said without the slightest desire to disparage the use of carefully made details when the cost will permit, as the full refinement of Colonial work can, of course, be obtained in no other way. While one or two firms of the highest class are at present

Own House at Framingham, Mass.
Charles M. Baker, Architect



Exterior and Plans of Cottage at Newtonville, Mass.
Derby & Robinson, Architects

First Floor Plan

making "stock" mantels of a high degree of excellence, their cost excludes them from use in the less expensive work which we are now considering.

It is sometimes claimed that the style lacks flexibility and on this account is not easily adapted to the more exacting requirements of modern planning. This is just as unintelligent as the Victorian idea that Gothic consisted merely of pointed openings, mouldings of a particular profile and foliated capitals naturalistic in treatment. As a matter of fact, when the problem is large enough to allow of any multiplicity of parts or complexity of motif, there is every opportunity for elaboration of design or picturesque treatment with the simpler forms. For this we find precedent in the well-known Fairbanks house in Dedham, Mass. Houses entirely of the seventeenth century, however, with hewn beams and leaded casements, while suggestive of much that is possible for reproduction, are not especially well adapted to modern methods of construction and modern building materials; just as the English half-timbered house is hopelessly impossible and usually in bad taste when reproduced in stucco on wire lath with false timbers of seven-eighths-inch boards.

Cottage at Sparkill, N. Y.
Aymar Embury II, Architect

Fault has sometimes been found with smaller cottages of the Colonial type on account of the lack of space in the second story. Obviously, if we design a one-story house and then attempt to beguile ourselves into the belief that the roof space may be made to contain the equivalent of a full second story, we are looking for a suspension of the rules of logic in expecting something for nothing, which is no more to be found in this case than in any other. Often the better way is frankly to design a two-story house, usually costing but little more, though perhaps at some sacrifice of the picturesque quality. Here again, however, we often follow a false lead, for the charming little Cape Cod house may be hopelessly out of place and inadequate in the midst of the higher buildings of the typical suburban or small town development. The one-story cottage with roof of rather low pitch is, however, an acceptable solution of the often objectionable "bungalow." The gambrel roof is often satisfactory, and with proper planning of the second story sufficient head room may be obtained. This may be increased by the rather overworked long "shed" dormer, at least on the rear, though to build a house with only one side for publication is a practice to be discouraged. The recitation of the "architects of Fate" of our

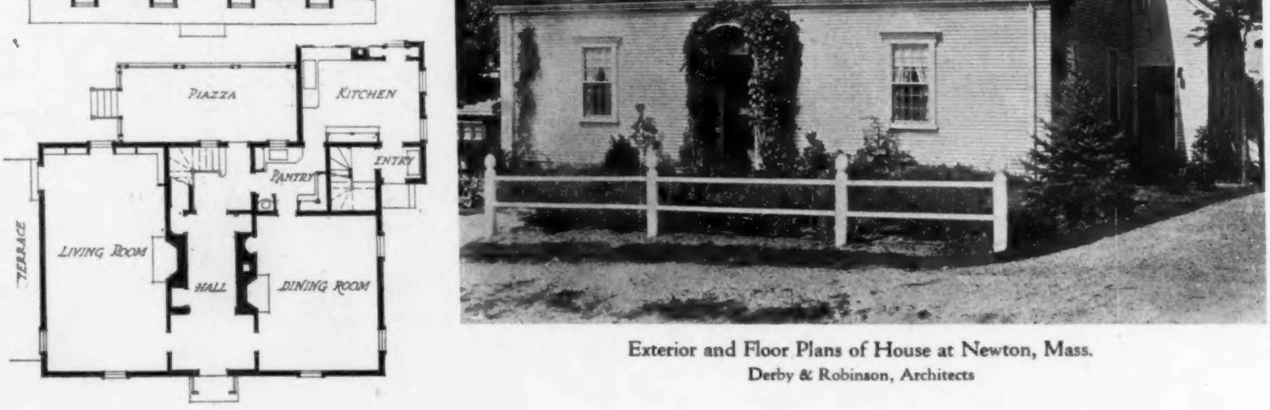
school days and the admonition that "the gods see everywhere" invariably comes to mind when the rear shed dormer is suggested, though with careful treatment it is not always to be discarded.

There was, perhaps, nothing more significant of the marvelous courage and spirit of the French in the very midst of their darkest hour and of their confidence in ultimate victory, than their calm and deliberate preparations for rebuilding in the ruined districts. Months ago the Société des Architectes Diplomés held, under the auspices of the French Government, an exhibition of the regional architecture of the invaded territory in connection with a competition for reconstruction. While the greatest importance was naturally attached to the improvement of living conditions, sanitation and the advantages of modern planning and construction in general, scarcely less stress was laid upon the importance of proper architectural treatment, or, for the Frenchman seldom hesitates to call things by their right names, in plain English, — beauty. The American architect in dealing with his clients, especially if they are "business men," usually has to beat about the bush, making excuses for whatever satisfactory architectural treatment he may have been able to attain, more or less surreptitiously, and playing up strongly on economy of construction or advantages of plan, knowing perfectly well, what the clients so often fail to realize, that the importance of these goes without saying.

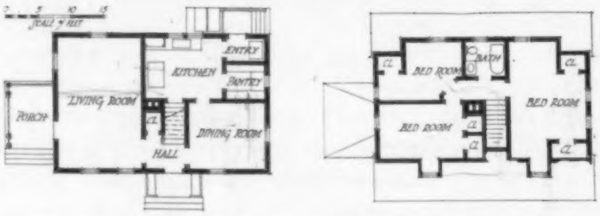
One cannot do better than to quote from a lecture by M. Reinach, relating to the rebuilding of the destroyed French towns: "On account of speed being a great factor, would it not be opportune to adopt the standardized type of house in cement or concrete, thus achieving speed and economy? I feel perfectly safe in foretelling that at the moment of settling, impatience, combined with the pursuit of material interest, will try to induce the sluggish and easily complacent mind to restore our destroyed villages in standardized cement houses, much in the fashion of some working settlements of London and some little towns built over night in the far West.

"To this I shall answer that, in every country, but particularly in ours, we could by no means leave aside the question of beauty. . . . For though ugliness was not always absent from the destroyed villages, yet, generally speaking, the rural house recommended itself by some pleasing trait; and it would be altogether unfair to repay

A Renovated Cottage at Framingham, Mass.



Exterior and Floor Plans of House at Newton, Mass.
Derby & Robinson, Architects



Exterior and Plans of Chauffeur's Cottage at Belmont, Mass.
Stanley B. Parker, Architect

the stoicism of all the victims of the devastated regions by rebuilding their abodes in the most depressing monotony. . . ." He then goes on to say: "It would be no less a violation of common sense to transplant in Lorraine and in Flanders the architecture proper to Provence than to transplant in the same country the lemon tree and the palm tree. . . . The architecture which fits especially the north or the south, the mist or the sun, varies on the spot at each epoch according to the necessary needs and to the degree of general progress. It is self-evident that a landowner of the twentieth century could not any better put up the mansions of his ancestors of the Middle Ages and the Renaissance than the latter the dwellings of their own predecessors, more rustic and primitive. But it is, as it were, the growth of the same tree with new branches and sprouts."

Of the architect who will endeavor to rebuild the villages, he says: "Then they will inspire themselves with the local tradition, not with a view to copying it servilely, but to continue it in the fashion of life which renovates without repeating itself. Though changes will have to be introduced, yet . . . once more beauty will be derived from utility. Thus we are reminded of the fundamental principles of good architecture. Service was given first place."

Another lecturer, M. Leon, says: "The climatic conditions shaped the forms of the roofs, affected the very planning of the farm;" and a third, M. Revault, calls attention to the "effects of the huge task of reconstruction on the speculators and admonishes his audience not to yield to the appetites of all those who are ready to take advantage of the opportunity."

Much of this applies to conditions in our own country, prevailing for the past three-quarters of a century and particularly acute at the present time. For this is the day of the ready-made plan catalogue, the results of which are ugly beyond expression. Throughout the land, from sea to sea, and from the wilderness on the north to the Gulf of Mexico, suburbs and country-side are being hopelessly and irretrievably spoiled by cheap, poorly built, machine-made structures, often in the worst of taste, which are in marked contrast with the fine and substantial, though usually extremely simple architecture of the past. It is neither to be expected nor desired that we should build to-day exactly as did our ancestors. It is desirable, however, that some sort of standard in taste should be maintained; some decency and fitness. To live in New England in a red roof bungalow with eaves overhanging three feet and cobble-stone porch columns two feet square should be recognized as just as bad taste as to appear in the streets masquerading in the costume of an Italian peasant or Mexican Indian.

What, then, is the standard of taste and how is it to be obtained? First, as M. Reinach has said, that it shall be characteristic of the region, and we are speaking now particularly of the Eastern and Middle States. "They will inspire themselves with the local tradition, not with a view to copying it servilely, but to continue it in the fashion of life which renovates without repeating itself." "The growth of the same tree with new branches and sprouts." The red roofed bungalow with overhanging eaves might be well enough in the southern climate of California or Mexico, as houses of a similar type are suited to the climates of India, Italy or Greece, where protection from the sun is desired. In western countries, however, they are unsuitable and, therefore, in poor taste. The roof of fairly steep pitch, with close eaves and rake is obviously admirably adapted to a climate where snow and rain and short, dark days prevail during a good part of the year. Walls may be of white clapboards or shingles, — stucco or brick if it may be afforded, — with green blinds and double-hung, twelve-light stock sash painted white. Stucco on

hollow tile is very satisfactory and concrete treated architecturally in a manner similar to stucco is equally good. All of these are the commonest materials in every-day use, all admirably suited to their purpose and capable of producing a house indigenous to the soil and economical of construction as any that can be built.

The task of the reformer with a hobby is ever a thankless one. But the war has brought its opportunities, compensating in a small measure for its work of destruction. A few of our new industrial villages for war workers even now give promise of realizing many of these very qualities to which we have referred, thanks to the painstaking efforts of some of those who have been entrusted with their creation, and are bound to have a lasting influence in the future. What can be done to foster and increase this influence throughout the country?

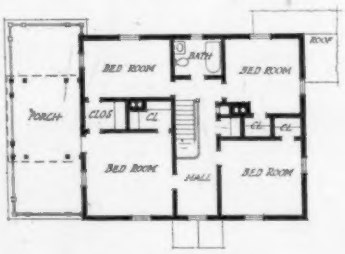
There is, of course, a great demand for ready-made plans. The average man often thinks he cannot afford an architect, even if he appreciates the advantages of having one, which generally is not the case.

A committee of the English Board of Agriculture and Fisheries, appointed to consider the problem of rural housing, has had prepared a series of excellent plans, with specifications, for small houses, cottages, and houses in blocks. The working drawings are sold at one or two shillings for the set, and a penny for the specifications. Something of the kind is also being done in Canada. May not this be a solution of the problem? Plans for good houses should be furnished for a sum so small that the price cannot preclude their use by any one. A large number of carefully studied types should be made available. To say that this sort of thing would interfere with the legitimate practice of the architect is absurd. It would create a more general appreciation of the importance of his work.

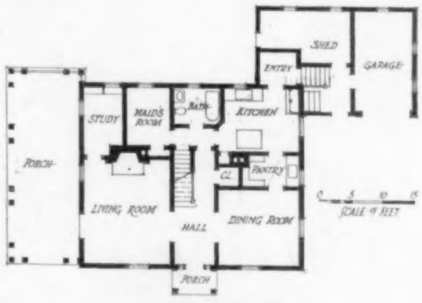
The ideal means of distributing these should be through the state or national government, but as the ideal is, unfortunately, seldom attained in this way, the various planning boards or local boards of trade would seem a suitable means. Something of this sort is already being done by the Massachusetts Agricultural College at Amherst, and by the State of Minnesota.

In the first place, after a certain number of studies had been prepared and, if possible, a number of model houses built which could be photographed, an educational campaign should be undertaken. Drawings, photographs and descriptive literature should be exhibited in schools, colleges, libraries, art museums, boards of trade, granges and elsewhere. Explanatory lectures should be given in the different communities, with lantern slides illustrating the objects to be attained. It has often occurred to the writer that a more general attempt should be made in the schools and colleges to cultivate an appreciation of architecture as well as of literature and music, and that a short course should be given to all students outside of the courses taken by those especially interested in fine arts.

It is a foregone conclusion that the houses should be economically and conveniently planned and capable of construction at such a cost as to compete favorably with the cheap stock plans or speculative builders' houses. This should appeal to social and civic workers, but a strong appeal should also be made to those who would be in-



Second Floor Plan



First Floor Plan

House at Cohasset, Mass.
Stanley B. Parker, Architect

Design for Group of Six-Room Cottages
George F. Marlowe, Architect

terested in the preservation of an acceptable architectural type throughout a given region.

Obviously, work of so wide a scope should be under the direction of those well fitted to undertake it. The committee or commission should include an architect or architects who have been successful with domestic work, and a builder of good standing used to construction of this character. The commission or the specialist employed by it should also act in an advisory capacity to assist in the selection of the best type for a given case, in the planning or laying out of a group or community if construction on a larger scale were involved, and in the grading and planting which owners should always be encouraged to undertake even on the smallest suburban plot.

If France, in the midst of her struggle for existence has thought these problems of sufficient importance for serious and careful consideration, should not we find them equally so?

Model of Cottage Group Designed on Lines of Early American Farmhouses
Andrew H. Hepburn, Architect

ARCHITECTURAL & BUILDING ECONOMICS DEPARTMENT

C. STANLEY TAYLOR, *Associate Editor*

What Constitutes "Cost" in a Cost Plus Contract?

AS outlined in the article on "Protecting the Owner under a Cost Plus Contract" which appeared in this department in the September issue of THE ARCHITECTURAL FORUM, ever increasing interest is being evidenced in the feasibility of the cost plus method of building, not as a temporary relief for unsettled conditions, but as a permanent institution in the building field. Practically all large building projects, and in fact a great percentage of smaller operations, are now being carried out under this form of contract.

Brigadier-General R. C. Marshall, Jr., Chief of Construction Division, U. S. A., has recently stated that "no contractor should be called upon or permitted to undertake the performance of any contract that within the four corners of the paper upon which it appears is or may be written the financial bankruptcy of the contractor. It is unjust; it is unequitable; it is uneconomic. The great lesson of this war on the subject of the relationship between the contractor and the owner is the cost plus contract. This represents the only equitable basis under which a contractor may perform constructive and economic service for the owner. It is the only form of contract which affords protection to both parties."

In considering this subject a question of direct interest to the owner is involved in the term "cost." He understands the basic elements of the cost plus contract, and through analysis may develop various methods of protection under this form of contract. The question of interest, therefore, is what constitutes cost — and of this cost what items should the owner fairly pay?

The Three Classes of Costs

In the handling of any building project, from the financial viewpoint, there are three classes of costs:

1. Those which should be paid directly by the owner.

2. Those which should be paid by the contractor and reimbursed to him by the owner.

3. Those which should be borne by the contractor as expense against his fee.

In order to analyze clearly the various cost elements and allocate them in a manner which shall show clearly the method through which they should be handled, it will be well to outline a complete tabulation of cost elements in a cost-plus building project. These are as follows:

Tabulation of Cost Elements

(All items usually paid by owner are shown in ordinary type; those which represent actual cost to the contractor are shown in italics.)

Materials.
Labor (all directly on contractor's payroll).
Sub-contracts.
Contractor's fee.
Supplies (hardware, paints, etc.).
Equipment (including temporary structures, hand tools, canvas, tarpaulins, etc.).
Transportation (materials, equipment, plant labor).
Bond and insurance premiums.
Rentals on construction plant.
Negligence loss.
Defective work loss.
Material purchase loss.
Excess cost loss.
Salaries in field office.
Expediting material production and transportation.
Traveling expenses of contractor and employees.
Permit fees, royalties and legal costs.
Fire, flood or similar losses by contractor (not compensated by insurance).
Drafting.
Minor expenses (telegrams, express, blueprints, etc.)
Salary of the contractor if an individual, or salary of any member of the contractor if a firm, or salary of any officer of the contractor if a corporation.
Salary of any person employed, during the execution of the work, in the main office or in any regularly established branch office of the contractor.
Contractor's direct overhead or general expenses of any kind.
Interest on capital employed by contractor in plant or in expenditures on the work.

Cost Subject to Direct Payment by the Owner

The experience gained in past years in contractual relationships between owners and builders has resulted in establishing precedents which make it possible to determine fairly in what manner various costs arising during building construction shall be met. The American Institute of Architects is now giving this subject considerable study, and several tentative drafts of an agreement form between contractor and owner have been drawn up, together with explanations of various points. This contract provides properly that the owner shall meet directly the following costs:

1. Materials.
2. Sub-contracts.
3. Contractor's fee.
4. Supplies (hardware, paints, etc.).
5. Equipment (including temporary structures, hand tools, canvas, tarpaulins, etc.).
6. Transportation (materials, equipment, plant labor).

7. Bond and insurance premiums.
8. Rentals on construction plant.

The question of direct payment by the owner of these costs has been discussed by the writer with several experienced builders (and incidentally with several owners now engaged in building), and opinion has been unanimous in favor of the practicability of such arrangement. On some cost plus contracts, however, the builder does not finance the payrolls, as the owner may prefer to keep check on these through his own organization. The practical method carried out in such cases involves a report on Thursday of each week by the builder to the owner giving in statement form the various material, supply and similar bills on which payment is due, together with the payroll for the week and a statement of the contractor's fee on these items. Checks are drawn by the owner for direct payment of the various accounts outlined above, together with cash for the payroll and a check for the builder's commission. This has proven a fair and equitable manner in which to handle a cost plus operation, and it serves to keep the owner in touch with the progress of the work.

Defining Various Costs

A simple definition of the various costs as set forth above will be of interest where the meaning is not self-evident. In presenting its draft of a cost plus contract form the American Institute has also issued an explanatory pamphlet which defines many of the costs in an excellent manner, making it unnecessary, for the purpose of this article, to go beyond such definition in but few cases.

Of the costs outlined above, Numbers 1 to 7 are self-explanatory. Number 8 — rentals on construction plant — has by general practice been made chargeable for direct payment by the owner, whether the plant is rented from the contractor or others in accordance with rental agreements which may be approved by the architect. The cost of rental should be defined under the terms of the rental agreement to include transportation, cost of loading, unloading, installation cost, dismantling, removal and minor repairs and replacements. "Plant" is defined as follows :

> Plant comes from many different sources, and under different conditions, of purchase or rental. No fixed rule can be laid down. Each individual piece of equipment that is bought or rented will be necessarily the subject of a definite agreement.
>
> In some contracts it is provided that when a certain percentage of the value of a piece of equipment has been paid in rental, the title thereto shall vest in the owner. This is felt to be an unwise procedure and involves complications of ownership and subsequent disposition of the equipment without any real benefit to the owner. The contractor, as the adviser of the owner, should notify him when it is better for him to purchase plant outright and when it is better to rent it.
>
> In renting plant it is not easy to cover the matter of repairs. The owner of the plant should furnish and maintain the plant in workable condition, and should make good "internal" defects that may develop — the results of normal use — or "wear and tear." Minor repairs and replacements due to the accidents of use are a proper charge against the work and should be made by the person renting the plant. Provisions to this effect should form part of the rental agreements.
>
> The furnishing of all necessary plant for a fixed sum is undesirable.

In this connection it is usual for rental agreement or contract to include a schedule of machinery and equipment which goes to make up plant necessary for the particular operation. Reference is here made to the United States Government form of cost plus fee contract for cantonments where in a typical schedule the machinery and equipment which should be considered as plant may be found.

It might be well also to note here the opinion of the American Institute of Architects on the question of small tools which are considered under the heading of equipment above. This opinion, which seems to be based on experience and sound reasoning, is as follows :

> Small tools constitute one of the most troublesome items. Some prefer to cover small tools and certain other "plant" items by a lump sum for which the contractor is to furnish all that are needed for the work. This, however, is illogical in that it inserts a small lump sum contract with a cost plus fee contract and is unsatisfactory and troublesome as it creates the necessity of determining constantly whether or not certain items fall under the lump sum or are to be paid for as part of the regular cost. It seems best to have all such small tools as are actually used up during the work paid for as part of the cost, and any that are used, but remain of value at the end of the work, taken over by the contractor at a fair valuation to be agreed on.
>
> In less important forms of work, such as small repairs or alterations, it is often customary for the contractor to furnish small tools without expense to the owner, being covered by the general percentage or fee. Such a case may be covered by inserting in the contract a provision such as the following :
>
> The contractor further agrees to furnish all tools and construction plant necessary for the proper and expeditious performance of the contract without making any charge for their cost, use or repair.

Costs Paid by and Reimbursed to Contractor

As has been explained in foregoing paragraphs, the question as to whether the contractor shall pay the labor payroll and then be reimbursed by the owner, or present his payroll requirements for direct payment by the owner, is naturally dependent upon the original agreement and should be definitely settled at that time. It is evident that the closer contact an owner may have with the work as it proceeds, the more familiar he is with progress and the channels through which his

money is being spent. In addition to labor cost other costs which are paid by the contractor and reimbursed on his statements are as follows:

1. Salaries in field office.
2. Expediting material production and transportation.
3. Traveling expenses of contractor and employees.
4. Permit fees, royalties and legal costs.
5. Fire, flood or similar losses by contractor not compensated by insurance.
6. Drafting.
7. Minor expenses (telegrams, express, blueprints, etc.).

These items are largely self-explanatory. Number 1—salaries in the field—represents a cost which is the basis of considerable argument and misunderstanding. It would seem fair to eliminate this cost on the following basis, as is done on many building operations to the satisfaction of both owner and contractor. That is, that field office employees shall be only those engaged on any work in connection with the particular project being carried out, and that this work shall not include any activity which normally would be done in the contractor's office and which is fairly chargeable against his profit.

Number 2—expediting material production and transportation—is a cost which is not usual, except on very large operations where it may become necessary to send employees of the contractor to check and expedite production of certain material or to follow up freight shipments.

Number 3—traveling expenses of contractor and employees—should be considered that proportion of transportation, traveling and hotel expenses of the contractor, his officers or employees, incurred in the discharge of duties connected directly with the work.

Number 4—permit fees, royalties and legal costs—would include any damages for infringement of patents and costs for defending suits therefor. Also for deposits lost for causes other than the contractor's negligence.

Item Number 5 above is outlined in the tentative contract drawn up by the American Institute of Architects as follows:

> Losses and expenses, not compensated by insurance or otherwise, sustained by the contractor in connection with the work, provided they have resulted from causes other than the fault or neglect of the contractor. Such losses shall include settlements made with the written consent and approval of the owner. No such losses and expenses shall be included in the cost of the work for the purpose of determining the contractor's fee; but if, after a loss from fire, flood or similar cause not due to the fault or neglect of the contractor, he be put in charge of reconstruction, he shall be paid for his services a fee proportionate to that having general application.

Number 6—drafting—includes only such drafting or modifications in plans and details as may be carried out by the contractor's force.

Costs Which the Contractor Must Bear

A general outline of the costs which the contractor must bear constitutes the charges which he must make on his own books against the fee received from the work in order to determine his net profit. These are as follows, including certain potential charges which may materialize.

1. Salary of the contractor if an individual, or salary of any member of the contractor if a firm, or salary of any officer of the contractor if a corporation.
2. Salary of any person employed, during the execution of the work, in the main office or in any regularly established branch office of the contractor.
3. Contractor's direct overhead or general expenses of any kind.
4. Interest on capital employed by contractor in plant or in expenditures on the work.
5. Negligence loss.
6. Defective work loss.
7. Material purchase loss.
8. Excess cost loss.

In general, these costs as outlined above are also self-explanatory. It has been customary in some cases for *pro rata* charges to be made on salaries of firm members and officers. It is essentially unfair to the owner that such charge should be made and in drawing up a contract this matter should be clearly understood.

As stated by the Institute and substantiated by the opinions of practical builders and of many owners, the theory of a cost plus contract is that the contractor shall be reimbursed every cost, direct or indirect, forming the subject of the contract, and that for his services in conducting the work he shall receive a fee which is absolutely net to him and subject to no deductions except for negligence (and his own office overhead cost).

This question of negligence brings up the potential items Numbers 5, 6, 7 and 8 in the above list. Just what may constitute negligence, defective work, material purchase loss and excess cost loss is at best an indeterminable quantity. It is evident, however, that if mistakes are made in the purchase of material so it is necessary to sell material at a loss; if defective work is done which must be replaced at a loss; if through direct negligence accidental occurrences may increase the cost; or if in buying the prices paid are palpably high, there must be *prima facie* evidence to this effect. In order to avoid misunderstanding which may ultimately result in expensive law proceedings, it is well to agree in advance to place this phase of cost in arbitration where dispute arises.

In the above paragraphs, in so far as space has allowed, it has been the purpose to give a clear conception of what "cost" is, as used in the sense of a cost plus contract, and to show exactly how and by whom the various costs should be borne.

Competitive Bidding on a Cost Plus Fee Basis

IT is easily possible to devise methods by which the element of competition may be introduced in letting a cost plus fee contract.

One ingenious method of accomplishing this end and at the same time enabling the contractor by efficiency in the conduct of the work to increase his own profit while reducing the expense to the owner is now in use. It may be explained by a clause from an actual contract covering the construction of an important viaduct.

"Each bidder shall state his estimated 'cost of the work' which shall be termed contractor's estimated cost, and shall also state a fee which shall be termed contractor's profit fee, which shall be separate from and not a part of the contractor's estimated cost. The contractor's profit fee must not exceed 10 per cent of the contractor's estimated cost.

"The contractor's estimated cost shall be assumed to be based upon the approximate quantities hereinafter stated. Inasmuch as the actual quantities in the finished structure may vary from those approximate quantities, each bidder must also quote unit prices for each of the various construction items as given in the form of proposal and bid herewith. These unit prices shall be applied to the differences between the approximate quantities given and the actual quantities in the completed structure. The sums so obtained shall be added to or subtracted from the contractor's estimated cost accordingly as the actual quantities are respectively greater or less than the corresponding approximate quantities, thus fixing an amount to be termed the revised contractor's estimated cost.

"The contractor shall be paid the actual cost of the work plus a profit fee. If the actual cost of the work is equal to the revised contractor's estimated cost, the contractor shall be paid the contractor's profit fee in full. If the actual cost of the work is less than the revised contractor's estimated cost, the contractor shall be paid the contractor's profit fee, and in addition thereto one-half of the amount which the actual cost of the work is less than the revised contractor's estimated cost. If the actual cost of the work is more than the revised contractor's estimated cost, the contractor will be paid the contractor's profit fee less one-half of the amount which the actual cost of the work is in excess of the revised contractor's estimated cost; but in no event shall the contractor be paid less than the actual cost of the work plus one-third of the contractor's profit fee."

Next is defined the actual cost of the work. "Profit fee" is then defined as follows:

"The profit fee paid to the contractor shall be deemed to cover and include the contractor's profit, the use of his organization, his skill and energy, his overhead expenses, administrative expenses, services of contractor's executives, expenses of contractor's executives giving occasional attention to the work, services of the general superintendent devoting all his time to the work, all contractor's legal expenses, interest on moneys used, taxes, all expenses of any office or offices of the contractor other than the field office on the work, and all other expenses deemed by the engineers not a part of the actual cost of work as herein defined."

In explanation of the operation of this contract the following statement has been made:

"The contractor, by attention to the work and efficiency in administration, may increase his profit, while at the same time he reduces the expense to the owner. On the other hand, although he is in a position where he probably will have small financial loss, he may suffer the loss of his time and attention to the work. The percentage fee to be named is limited to 10 per cent, and the minimum fee above the actual cost to one-third of that amount, or not to exceed 3⅓ per cent of the cost of the work. It is estimated that this 3⅓ per cent will not more than cover the items specified as part of the profit fee. It is essential in such a contract to draw a very distinct line between what is to be the actual cost of the work and what is to be covered by the profit fee and to exclude from the actual cost of the work all indefinite charges or amounts which cannot readily be checked by ordinary auditing."

Other methods have been used by which competitive bidding may be obtained on the cost plus fee basis, as for instance the method employed by the U. S. Housing Corporation, in which the various bidders not only competed in the amount of their fee, but also were called upon to name their estimated total cost, their organization and the personnel available to handle the work in the field, the amount for which they would furnish the plant required for the work, and the estimated time needed for the work. A definite scale of values for the various items determined which was the low bid on the project as a whole.

In order to eliminate any suspicion as to the sincerity of the contractor in holding down costs, a carefully worked out form of contract which has been employed in several cases involves in its simple details the following factors: A careful estimate of cost by the contractor on which his fee of 10 per cent is based. If it is found at the end of the job that the estimated cost has been overrun, an equal percentage of the overrun is deducted from the fee as based upon the estimate, so that the contractor's fee is reduced in proportion to the amount of overrun. In other words, if a building is estimated by the contractor to cost $200,000, the contractor's fee is set as 10 per cent of the amount, or $20,000. If, however, it is found upon completion of the job that the building has cost $250,000, 10 per cent of the overrun, or $5,000, is deducted from the contractor's fee, cutting it down to $15,000. This method is good in that it creates an incentive without disturbing the various valuable elements of the cost plus system, nor is the contractor made financially liable in a manner which will either cause him to be bankrupted by the job or to lose interest and refuse to finish the work.

Insurance Engineering as a Factor in Architectural Service

A SUBJECT which has received very little consideration on the part of the average architect is that of providing safety against fire loss as a factor in design. There can be little doubt that the average person realizes that there is an excessive fire waste in this country and that considerable effort is being put forward by various interests toward encouraging the reduction or elimination of dangerous conditions. In fact, a definite profession known as insurance engineering has developed as a result of the need for studying building design and equipment from the fire hazard and insurance viewpoints.

Insurance engineering, broadly defined, is a service which involves a careful study of fire hazard in any building for the purpose of determining what methods of prevention and protection may be used to reduce the danger of loss by fire to the lowest minimum. Incidentally it is evident that such reduction of fire hazard in a building and the provision of proper protective measures should reduce the cost of insurance. As a matter of fact, this is the case, as the fire insurance underwriters have definite schedules in rating buildings. These rating schedules take into consideration the class of materials used, the design of a building in so far as protection against exterior communicative fires may be concerned, and the provision of fire walls to reduce dangerous areas. The underwriters' laboratories are known in a general manner to all architects, their specific purpose being to test various building materials and protective devices and to classify them according to their qualities of fire resistance and protective value.

To demonstrate the need of studying this subject as far as the architect is concerned we have but to quote the planning of the Equitable Building in New York City. It is fairly well known that the Equitable Building represents the highest achievement of fire safety in any building of its size in the world. When the first plans were drawn for this building a tentative insurance rate was quoted by the underwriters to whom the plans were tendered. The owners, however, wisely engaged the services of an experienced insurance engineer who went over the plans carefully, making recommendations for the use of unburnable materials at many points; introducing protective features such as wire glass; sprinkler system at points of special hazard, such as kitchen, storage rooms and service rooms; automatic fire doors, and carefully protected elevator shafts to prevent entrance and spread of flames. This building is practically divided into four buildings by fire walls, each unit having its own means of egress such as smoke-proof tower and well protected elevator system. As a result of the introduction of these features and the reduction of the fire hazard, the insurance rate was reduced to about one-quarter of that which would normally have been placed upon the building. This resulted not only in a definite saving on insurance premiums, but in providing a very definite incentive for the location in this building of business firms whose valuable records are well safeguarded against loss by fire.

In a brief consideration of fire loss the direct loss is easily understood and is usually compensated by insurance. To such an extent has the idea of insurance compensation for fire loss been instilled in the minds of the American public that comparatively little attention is given to the fire hazard by the average person. There is a subconscious assurance that if a building is burned, the insurance company pays the loss.

As a matter of fact, however, the indirect loss by fire which is not compensated by insurance probably amounts to over five times the direct loss in this country. It may be interesting to consider briefly what constitutes indirect loss. First, we may consider the loss of documents, valuable papers and correspondence which cannot be replaced and in many cases cannot in any way be compensated. Again, there is the checking of business momentum, for instance, when a factory is burned. Insurance may compensate the building loss and even the payroll loss, but the entire course of the business is checked; production is impossible for many months; active markets which should be taken advantage of are lost, and the entire operation of the business through forced suspension is so curtailed and disrupted that the indirect loss to the manufacturer may easily represent considerably more than the direct fire damage.

Normally it would seem that the masonry building is unburnable, and this is true in so far as the masonry portions may be concerned. As a matter of fact, however, the average large fire loss occurs in a masonry building, the unburnable walls of which really constitute flues and furnace walls; while the wood trim, sash, doors and other inflammable material incorporated as a structural part of the building constitute paths along which flame may travel.

The attitude of insurance companies toward this matter of safety building has undergone a considerable change in the last few years. As the insurance business has become more directly under public control, the sources of income and profit have been eliminated more than in the earlier years of great reserve funds.

Recently an extremely interesting development has taken place in this field. During the war period the insurance companies imposed an excess 10 per cent premium charge to meet increased hazards owing to abnormal conditions in the industrial and business fields. Since the close of the war, however, State Insurance Commissioners have refused to permit the further collection of this excess premium. This means a source of curtailment in the revenue of the underwriting corporations and it has been determined that this can best be made up through a substantial reduction in the country's fire waste. Apparently such action is economically sound as it is certain that the annual fire loss is in a large measure preventable. In many fields this fact has been tested — the conservation work carried out by the underwriters among the grain elevators of the West and Northwest during the past year provides simple proof of this fact. Here a rigid system of inspection, insistence upon the erection of fire walls, installation of automatic sprinklers, fire alarms and other protective devices have been so effective that fires in grain elevators have been practically eliminated.

The National Board of Fire Underwriters have now determined to carry out an extensive program of educational and exemplary work throughout the country. The present program contemplates dividing the country into five districts, — New England and the Coast States constituting one; the Southern States another; the Middle States a third; Northwestern group a fourth, and the Pacific Coast territory a fifth. Each territory will be controlled from a divisional office, the whole to be under the general direction of George W. Booth, chief engineer of the National Board of Fire Underwriters, with headquarters in New York City.

As a very positive means toward the desired end, the adoption of modern building ordinances will be advocated, and where these are already in force their rigid application will be urged.

It is evident that with the excellent work in this field which has been done by the National Fire Protection Association, augmented by this broad activity of the underwriters, there will undoubtedly develop a strong current in favor of reducing fire hazard and insurance premiums. It is therefore evident that the architect must give more serious consideration to this question. Not only as a service to his client is he called upon to provide the most efficient and serviceable type of building which may be maintained at the lowest possible charges, but apparently the strengthening of building codes and ordinances against hazardous conditions may be expected, and in this case designers of buildings will be forced to consider this problem.

There can be no doubt that much of the responsibility for fire waste in this country rests upon the architectural profession. Architects, in so far as the structural integrity of a building may be concerned, bear the direct responsibility of incorporating in their design such features of prevention and protection as may at once discourage conflagrations and destructive fires. The structural fire hazard is divided definitely into two classes, — the exterior and interior hazard. The exterior fire hazard has to do with the danger of communicated fires. To avoid this danger the insurance engineer will carefully consider surrounding buildings, both existing and potential. Where, adjoining, there are to be found small structures of inflammable type, window openings should be protected by the use of shutters or metal window frames with wire glass, and other exterior openings should be likewise protected so that in case of adjoining fire, flames cannot find their way into the building. In other words, the desired result is to obtain exterior walls where obstruction to the passage of flames is prevented at every danger point. In the case of small buildings such as dwellings, a large percentage of fire destruction results from communication of fire to frame exteriors and wood shingle roofs. This hazard is one which at best must be dealt with in a commonsense manner. It is evident that large areas of congested frame construction are potential conflagration points, and houses built in such districts should be protected by the use of unburnable materials. In less congested areas the choice of materials is less limited.

The second structural hazard is found in the interior design of a building. Space at this time does not permit of an exhaustive analysis of interior fire hazard, but it is evident that all vertical shafts in a building should be so protected that flames cannot communicate from one floor to another. This is done by the use of fire doors which are automatic in their operation. Again it is considered that no open area of over 5,000 square feet should be permitted, as it is possible to provide fire walls to subdivide larger areas than this. Protective features, such as automatic sprinklers and fire extinguishing devices, should be provided at points where there is danger of fire origin or quick spread of flames.

It is evident from the points brought out in foregoing paragraphs that here is a subject worthy of careful study by every architect. Membership in the National Fire Protection Association is open at a nominal charge, and through this and various underwriters' organizations literature containing exhaustive studies of this subject may be obtained.

Post-War Committee — More Comprehensive Service

Editors, The Architectural Forum: Be there a need of a more comprehensive service? Most decidedly yes, if the client is to be considered.

Ordinarily he is one who is busily engaged in his own particular field. Building is comparatively incidental to him. His time is valuable to him; he knows little of the technical side of building and does not feel warranted in learning it, for there are plenty of trained men who are desirous of serving him.

Usually he is interested, first of all, in the cost of the contemplated structure, and he looks for help in this direction. Too often this is only obtainable from a contractor.

Having secured the desired information he then wishes to know how to proceed with the work with the least inconvenience to himself. At this point he may be told of the complete service idea which includes the designing, constructing, furnishing and sometimes financing. All he has to do is to sign on the dotted line. Eureka! No time wasted, no bother about details. Just a check and a vote of thanks when the work is done. Appealing? Of course it is! Is it the best way? That depends on how much the client's time is worth per minute. Very few could actually afford it, if they analyzed the problem accurately.

Has it received the intensive study it deserved? Does it express the clients individuality? Has it given one hundred cents worth for each dollar of the check? If put to the acid test of impartial, scientific analysis will it be found to be the best method?

The answer will be illuminative and valuable.

But the complete service idea is attractive and should be studied; its lessons learned; its good points adopted and its defects discarded.

Attention has been called to the results achieved by the United States Government during the war, and it is suggested that this might be the desirable method to pursue. Is it really?

The Government called in architects, engineers and contractors and said we have so much work to be done in a given time and need your help. It was given enthusiastically; what seemed impossible became a fact and the work was turned over on time.

Why not adapt such successful methods to present-day needs? Can it be done? Yes, with certain modifications.

The men who achieved such instructive results were selected from all over the country because of their peculiar fitness for the task. They were engaged in independent practice and had made good. They became an organization and co-operated with one another and got there. They had the knowledge and the experience and applied them unselfishly with patriotic fervor. Patriotism made it possible! That incentive passed with the signing of the armistice. After that each one began to consider himself and his individual practice. Few, indeed, would be willing to lose their identity by becoming a part of an organization. Their reputations are their individual property, to be maintained and increased by their own efforts.

With the organization eliminated and the service desirable what can be substituted?

Co-operation! How? The architect, engineer and contractor to act as a unit or a committee. Any one of the three could act as spokesman, for leadership is a personal quality rather than a divine right of a particular profession.

Acting as one they render the desired service, and because each has his independent practice they never lose sight of their individual responsibilities, consequently they are able to serve more impartially. Designing and construction are two separate and distinct functions and are so recognized by thinking men in and outside of the building industry. One should not be subordinated to the other. It is not only possible but highly desirable that they should form an alliance.

Should those who assist the principals be more than employees? Yes, when they can qualify as junior partners. New blood and enthusiasm coupled with ability are needed to keep up-to-date. The knowledge and experience of the seniors should not be lost when they retire or die. Progress should be continuous and such relationships make it possible.

An architect's services should be complete, no matter what the relationship with his client and his fellow-workers may be. He should be able to advise as to the permanency of the building, be it residence, apartment, institution, mercantile or industrial structure. This involves a study of the growth and development of cities and their sub-divisions.

A building improperly located or a site with an ill-advised building may mean a loss of a large portion of the investment. He should have a thorough knowledge of the laws and restrictions governing buildings. Lacking this, time and money, his and the clients, may be wasted. His plan and specifications should be complete, and this may require the services of structural, mechanical, electrical, sanitary and, perhaps, illuminating engineers. They should be his associates on the work and the fact indicated on the drawings. This is a departure from the usual practice, but credit should be given when due.

Inspection in the shop and in the field may require the services of inspection engineers. Superintendence may require partial or entire time of a clerk of the works. All of these should be included by the architect in his fee whether it be on a percentage basis or other method. To do otherwise is to mislead the client. He has a right to expect that all designing and inspection that may be necessary shall be included in one transaction.

This complete service cannot be rendered for the customary prevailing fee, but the client would feel better about paying it all to one man whom he holds responsible for the work in its entirety. Once establish as a principle the complete service idea and we will find the profession on a sound and respected basis.

St. Louis, July 30, 1919. ERNEST JOHN RUSSELL.

EDITORIAL COMMENT

COORDINATION OF THE BUILDING INDUSTRY

IN connection with the Bridgeport housing development, which is illustrated in other pages of this number, several very interesting investigations were carried on. The United States Housing Corporation was particularly interested in building comfortable houses, suitable to the needs of the employees who were to occupy them, and embodying all possible elements tending toward economy and speedy construction.

As a result of these investigations methods of construction were adopted which are of vital interest to all concerned in the building industry. It may or may not have been an advantage that the Corporation, through its governmental function, could set aside all local regulations and building codes. It is a fact that some of the construction is in violation of existing ordinances; but it is recognized by experts as the equal of or superior to that required by local authorities.

There are many things in the building industry to-day which are carried over from the prehistoric past; there are many requirements still in force which should be rendered obsolete in the light of modern knowledge, and there are many accessories which are superfluous but which are advised by manufacturers and the labor element, all of which militate against conservative and economical building at the present time. It might be interesting to analyze the situation from all of these standpoints, but it will be sufficient to take a leaf from the book of experience of the United States Housing Corporation in their building development along one particular line of investigation.

One outstanding method of distinct saving in the plumbing installation, which for a time was adopted at Bridgeport, but which was later changed to the old form construction, was in the use of anti-syphoning traps.

The representatives of the Housing Corporation had conducted careful tests and investigations and had consulted with experts in sanitary conditions relative to the system of back vent piping. As a result it was decided to omit all back venting of traps and use anti-syphon traps instead. This change appears to be only a small point, but see what follows! The plumbers have less piping to install, the manufacturers have less piping to make, and the owner has less piping to pay for, and there is no doubt but that the plumbing installation under these conditions is equally good from the standpoints of health and sanitation. The time consumed in installation is obviously less and the possibility of "speeding up" the construction is real. This fact tends to the advantage of the employer and employee as well as the owner.

For some unknown reason labor has taken a very antagonistic attitude towards the installing of non-syphon traps, whether it be solely because of the less amount of labor involved or whether it be because anti-syphon traps displace customary portions of the installation, is difficult to say. The fact remains, however, that under the present conditions the unnecessary piping is continually installed. The building laws of many cities permit the use of non-syphoning traps, but usually with a provision which negatives the permission. The plumbers are especially vigorous in their opposition to the omission of this piping. Is it because they believe the non-syphoning trap unscientific and unsanitary? Is it because it gives them more work to do?

Do the manufacturers urge the retention of the back venting system simply because of the increased use of pipe? It seems as if this could not be the case because ordinarily the stock of pipe is far below the demand.

We are, therefore, forced to assume that there is a lack of coordination in the building industry which is not confined to the specific instance noted. Why this should exist when all parties are working toward a common end, is difficult to determine. It may be a reflection of the misunderstandings so prevalent at present between labor and capital; it may be due to lack of energy on the part of those associations that should look after the proper framing or revision of the laws governing construction; it may be due in part to excessive inertia on the part of the architectural profession.

In building construction, the corporation, if such it be, which is financing the operation is interested in economy; the corporation doing the manufacturing is interested in economy plus a volume of business; the corporation installing the work, which in this case we may assume as the labor element, is interested in volume and continuity of work in keeping the men busy the greatest possible number of days.

Why is it not possible, then, to so adjust the points of view of these different elements that all may pull together rather than pull apart? Why cannot the "corporations" be merged into one "co-operation"? Only by the close and friendly coordination of the financiers, manufacturers, labor, architects and owners can a real solution to our building problem be found.

Let us no longer do as our grandfathers did if modern wisdom shows a better way. Let us be on the watch for short cuts to economy so long as they lead us along in the direction of good construction and sound principles.